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FLORA
OF
BOMBAY.

THE

FLORA OF THE PRESIDENCY OF BOMBAY.

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BY

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FORMERLY PRINCIPAL OF THE COLLEGE OF SCIENCE AT POONA AND DIRECTOR OF THE BOTANICAL SURVEY OF WESTERN INDIA.

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VOL. II.

COMPOSITÆ TO GRAMINEÆ.

PUBLISHED UNDER THE AUTHORITY OF THE SECRETARY OF STATE FOR INDIA IN COUNCIL.

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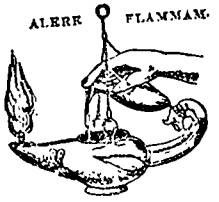

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FLORA OF BOMBAY.

Order LXXI. COMPOSITÆ.

Herbs or shrubs, rarely trees. Leaves usually alternate; stipules 0. Inflorescence a centripetal head of usually many small flowers (less commonly few or very rarely 1) sessile on the dilated top of the peduncle (*receptacle*), enclosed in an involucre of whorled bracts. Receptacle sometimes furnished with bracteoles (*paleæ, scales, bristles, fimbrillæ*), sometimes naked and smooth or with small pits (*foveolate*) or deeply pitted (*alveolate*). Flowers either all 2-sexual or some or all 1-sexual, variously arranged. Calyx-tube wholly adherent to the ovary; limb 0 or of scales, bristles or hairs (*pappus*). Corolla epigynous, gamopetalous, sometimes regular, tubular, 5–4-fid or -toothed with valvate æstivation; sometimes irregular, and either ligulate or bilabiate (corolla wanting in the female flowers of *Xanthium*). Disk epigynous. Stamens 5–4, inserted on the corolla and alternate with its segments; filaments usually free above; anthers 2-celled, introrse, cohering into a tube which sheaths the style (very rarely free), the cells often tailed at the base. Ovary 1-celled; ovule solitary, erect, anatropous; style slender, usually 2-fid; arms (sometimes connate) linear, ½-terete, acute, obtuse, truncate or penicillate, or tipped by pubescent cones, sometimes clavate, variously papillose, stigmatic near the margins. Fruit an achene, articulated to the common receptacle, generally sessile, provided with a basilar or lateral areole indicating its point of insertion, often prolonged into a beak at the top, naked above or crowned by the persistent sessile or stipitate pappus. Seed erect; testa membranous; albumen 0; embryo straight; cotyledons plano-convex; radicle short.—Distrib. Throughout the world; genera about 1000; species about 8000.

Series I. TUBULIFLOREÆ. *Flowers all tubular or the outer only ligulate. Juice watery.*

Tribe I. **VERNONIEÆ.** Heads homogamous; flowers all ☿, tubular. Anther-bases sagittate, rarely subcaudate. Style-arms subulate, hairy. Leaves usually alternate. Corollas never yellow.

Subtribe 1. Euvernonieæ. Heads distinct, many-flowered.

Pappus short, fugacious.	
Achenes 8–10-ribbed	1. Centratherum.
Achenes not ribbed	2. Lamprachenium.
Pappus 0; achenes 10-ribbed; anthers subcaudate	3. Adenoon.
Pappus long, copious, more or less persistent, usually girt with an outer row of short hairs or flattened bristles	4. Vernonia.

Subtribe 2. LYCHNOPHOREÆ. Heads 1- or few-flowered, crowded into dense masses like single heads.

Corollas usually cleft laterally; pappus-hairs rigid, shining ..... 5. ELEPHANTOPUS.

TRIBE II. **EUPATORIEÆ.** Heads homogamous; flowers all ☿, tubular. Anthers subentire at the base. Style-arms usually elongate, obtuse, minutely papillose. Leaves opposite or alternate. Corollas rarely orange, never truly yellow. Pappus usually setose.

Anthers truncate, minutely apiculate at the apex ..... 6. ADENOSTEMMA.
Anthers appendiculate at the apex ..... 7. AGERATUM.

TRIBE III. **ASTEREÆ.** Heads heterogamous, rayed or discoid; or homogamous, rayless. Anther-bases subentire, not tailed. Style-arms flattened or plano-convex, all or those of the disk-flowers terminated by a cone. Leaves usually alternate. Disk-flowers usually yellow; ray-flowers variously colored.

Subtribe 1. GRANGEINEÆ. Corollas of ♀ flowers 2–∞-seriate not exceeding the disk, 2-toothed or campanulate at the apex. Invol.-bracts subequal or the exterior foliaceous. Pappus 0 or very short.

Top of receptacle flat; pappus 0 or of a few bristles; margins of achenes thickened ... 8. DICHROCEPHALA.
Top of receptacle concave; pappus 0; margins of achenes not thickened ..... 9. CYATHOCLINE.
Receptacle convex or conic, naked; pappus a short tube with fimbriate mouth ..... 10. GRANGEA.

Subtribe 2. HETEROCHROMEÆ. Corollas of ♀ flowers ligulate, never yellow; pappus-hairs long, copious.

Invol.-bracts narrow ..... 11. ERIGERON.

Subtribe 3. CONYZEÆ. ♀ flowers when present filiform or scarcely minutely ligulate, yellow; pappus setose.

Invol.-bracts 2–∞-seriate ..... 12. CONYZA.

TRIBE IV. **INULEÆ.** Heads heterogamous, discoid or rayed; or homogamous, rayless. Anther-bases tailed (except *Laggera*). Style-arms linear, obtuse, inappendiculate, or the style of the sterile flowers undivided. Leaves usually alternate. Disk- and ray-flowers usually yellow.

Subtribe 1. PLUCHEINEÆ. Heads androgynous. Involucre-bracts herbaceous or dry, or the inner scarious. Receptacle naked. Style-arms of ☿ flowers filiform (not truncate), or the style of the sterile flowers undivided.

Heads distinct, solitary, corymbose or paniculate (rarely in globose masses in some *Blumeas*).
Pappus-hairs slender, copious.
Herbs.
Invol.-braets narrow, herbaceous or slender; styles of ☿ flowers 2-fid.
Anthers tailed ..... 13. BLUMEA.
Anthers not tailed ..... 14. LAGGERA.

Shrubs or undershrubs.
Involucre-bracts dry, usually broad; styles of ☿ flowers usually undivided ..... 15. PLUCHEA.
Pappus 0.
A low rigid herb; heads sessile, crowded; corollas of ☿ flowers 2-lipped ..... 16. NANOTHAMNUS.
Erect or diffuse herbs; corollas of ☿ flowers tubular ..... 17. EPALTES.
Heads collected into dense globose or ovoid terminal masses; corollas of ♀ flowers filiform.
Pappus 0. Herbs with winged stems ... 18. SPHÆRANTHUS.

Subtribe 2. FILAGINEÆ. Heads androgynous. ♀ flowers enclosed in the paleæ of the receptacle; ☿ flowers in the centre of the head, often naked. Involucre-bracts scarious or hyaline, rarely dry or radiating. Corollas of ♀ flowers filiform. Style of ☿ flowers undivided or with obtuse or subulate (not truncate) arms.

Glabrous shrubs or undershrubs; achenes large, 2–4-angled or many-ribbed, ciliate... 19. BLEPHARISPERMUM.

Subtribe 3. GNAPHALIEÆ. Heads androgynous or homogamous, discoid. Involucre-bracts scarious, often hyaline. Receptacle without paleæ. Style-arms of ☿ flowers truncate. Herbs.

Achenes all pappose; ☿ flowers all fertile; style bifid.
Pappus-hairs plumose ..... 20. LASIOPOGON.
Pappus-hairs not plumose ..... 21. GNAPHALIUM.

Subtribe 4. EUINULEÆ. Heterogamous, rayed (rarely subdiscoid); or homogamous, rayless. Flowers usually all fertile. Receptacle naked or with a few paleæ. Style-arms of ☿ flowers rounded or dilated at the apex.

Heads rayed; pappus-hairs few or many, subequal; achenes ribbed ..... 22. INULA.
Heads usually rayed; pappus-hairs slender, those of the ray few or 0; achenes not ribbed ..... 23. VICOA.
Heads rayed or discoid; outer pappus of scales forming a cup, inner pappus of hairs; achenes usually ribbed ..... 24. PULICARIA.
Heads homogamous; pappus of 2 ovate scales; achenes flat, winged ..... 25. CÆSULIA.

TRIBE V. **HELIANTHEÆ.** Heads heterogamous, usually rayed; or homogamous, rayless. Ray-flowers ♀, fertile or neuter; disk-flowers ☿, fertile or sterile. Receptacle paleaceous. Anther-bases not tailed. Style-arms of ☿ flowers truncate or appendiculate, or style of sterile flowers undivided. Pappus of 2–5 bristles or shortly paleaceous or 0. Achenes various, usually compressed, angular. Leaves (at least the lower ones) usually opposite. Flowers usually yellow.

Subtribe 1. LAGASCEÆ. Heads 1-flowered, in globose clusters. Involucre-bracts forming a toothed or fimbriate cup or ring.

A villous or scabrid herb; lower or all the leaves opposite ..... 26. LAGASCA.

Subtribe 2. AMBROSIEÆ. Heads heterogamous or unisexual, monœcious. Receptacle paleaceous between the ☿ flowers. ♀ flowers apetalous, fertile; ☿ flowers sterile. Anthers nearly free, with inflexed appendages. Style of ☿ flowers undivided. Achenes smooth.

Involucre-bracts of ☿ flowers free, those of the ♀ flowers forming a 2-flowered 2-celled capsule armed with glochidiate spines ..... 27. XANTHIUM.

Subtribe 3. VERBESINEÆ. Heads heterogamous, rayed or discoid; or homogamous and rayless; ray-flowers ♀, fertile or sterile; disk-flowers ☿, fertile or the innermost rarely sterile. Pappus cup-shaped or of 2–3 rigid paleaceous bristles or 0. Achenes all thick, or those of the ray triquetrous, those of the disk laterally compressed. Leaves usually opposite.

Inner involucre-bracts or outer paleæ of the receptacle embracing the fertile achenes of the ray-flowers.
Outer involucre-bracts 5, narrow, glandular ..... 28. SIEGESBECKIA.
Inner involucre-bracts not embracing the achenes.
Paleæ of receptacle flat, narrow.
Outer involucre-bracts many ..... 29. ECLIPTA.
Paleæ of receptacle concave, embracing the achenes.
Flowers of the ray ligulate, sterile; pappus 0 or a short ring ..... 30. SCLEROCARPUS.
Flowers of the ray fertile.
Achenes not ciliate.
Ligules small; pappus of 2–5 unequal persistent bristles ..... 31. BLAINVILLEA.
Ligules large, conspicuous, spreading, yellow; pappus 0 or a toothed cup or ring, or short scales..... 32. WEDELIA.
Achenes ciliate.
Ligules small, white or yellow; pappus 0 or of 2–3 bristles ..... 33. SPILANTHES.

Subtribe 4. COREOPSIDEÆ. Heads heterogamous, rayed; or homogamous, rayless; ray-flowers ♀, fertile or neuter; disk-flowers ☿, fertile, or the inner rarely sterile. Receptacle paleaceous. Achenes more or less dorsally compressed, 2–4-awned or naked.

Involucre-bracts in two rows; outer bracts few, small; inner membranous, often connate below.
Style-arms truncate, penicillate or with short appendages.
Leaves alternate ..... 34. GLOSSOCARDIA.
Leaves opposite ..... 35. BIDENS.
Style-arms with long hairy appendages . 36. GLOSSOGYNE.

Subtribe 5. GALINSOGEÆ. Heads heterogamous, rayed; or homogamous, rayless; ray-flowers ♀ (rarely neuter); disk-

flowers ☿, fertile. Receptacle paleaceous. Pappus of many paleæ, awned or plumose.

Heads rayed; paleæ of the pappus plumoso-ciliate ..... 37. TRIDAX.

TRIBE VI. **ANTHEMIDEÆ.** Heads heterogamous, rayed or discoid; or homogamous, rayless. Involucre-bracts 2–∞-seriate, dry or with scarious tips. Receptacle paleaceous or naked. Anthers not tailed. Style-arms truncate. Pappus 0 or coroniform, rarely shortly paleaceous. Leaves usually alternate. Corollas of the disk yellow; those of the ray variously colored.

Corollas of ☿ flowers 4-fid ..... 38. CENTIPEDA.
Corollas of ♀ flowers 5-fid ..... 39. ARTEMISIA.

TRIBE VII. **SENECIONEÆ.** Heads heterogamous, rayed or discoid; or homogamous, rayless. Involucre-bracts usually 1-seriate and subequal, with a few short outer bracts at their base, rarely ∞-seriate. Receptacle usually naked. Anther-bases obtuse or with 2 short points, rarely tailed. Style-arms of ☿ flowers truncate or appendiculate. Pappus of fine hairs. Leaves usually alternate. Disk-flowers yellow; ray-flowers usually also yellow, rarely variously colored.

Subtribe 1. EUSENECIONEÆ. Involucre-bracts 1–2-seriate, free or soon becoming so, sometimes with few or many bracteoles. Style-arms of ☿ flowers truncate or obtuse, penicillate or with a hairy tip.

Heads homogamous.
Heads bracteolate; style-arms ending in long hairy appendages ..... 40. GYNURA.
Heads ebracteolate, discoid; flowers purple or red; style-arms appendiculate . 41. EMILIA.
Heads bracteolate or not, discoid; style-arms with short ovoid tips; flowers yellow. Fleshy glabrous herbs..... 42. NOTONIA.
Heads heterogamous, rayed (rarely homogamous and rayless), bracteolate or not; style-arms truncate..... 43. SENECIO.

TRIBE VIII. **CYNAREÆ.** Flowers all tubular. Involucre-bracts many-seriate, imbricate, tips often with a scarious spinous or leafy appendage. Receptacle often fleshy, densely bristly or paleaceous, rarely simply pitted. Corolla-limb narrow, deeply 5-fid. Anthers tailed. Styles subentire, or the arms short, hairy or thickened towards the base. Pappus setose or paleaceous, very rarely 0. Achenes often hard. Leaves alternate, often spinous.

Subtribe 1. ECHINOPSEÆ. Heads 1-flowered, crowded in dense globose balls.

Thistle-like herbs ..... 44. ECHINOPS.

Subtribe 2. CARDUINEÆ. Heads distinct, usually ∞-flowered. Pappus-hairs distinct or connate into a deciduous ring. Achenes glabrous, the areole horizontal.

Pappus-hairs paleaceous, many-seriate; filaments hairy ..... 45. GONIOCAULON.

Subtribe 3. CENTAUREÆ. Heads distinct, usually many-flowered. Pappus various. Achenes glabrous, the areole very oblique or lateral.

Heads homogamous; flowers all ☿, fertile; achenes smooth, faintly ribbed ..... 46. TRICHOLEPIS.
Heads heterogamous; outer flowers 1-seriate, neuter; achenes strongly and regularly 5–15-ribbed ..... 47. VOLUTARELLA.

TRIBE IX. **MUTISIEÆ.** Heads homogamous; flowers all tubular and ☿, or the outer bilabiate; or heterogamous, with the ray-flowers ♀ or neuter, sometimes bilabiate. Involucre-bracts usually ∞-seriate, unarmed or spinescent. Receptacle rarely paleaceous. Corollas 2-lipped or with a deeply 5-fid limb. Anthers usually tailed. Style-arms rounded or truncate, inappendiculate. Pappus setose or paleaceous, rarely 0. Leaves radical or alternate, rarely opposite.

Subtribe 1. GOCHNATIEÆ. Corollas tubular; segments of the limb narrow, equal or obscurely 2-lipped. Involucre-bracts rigid, straight, pungent.

Pappus-hairs copious, ∞-seriate ..... 48. DICOMA.
Pappus 1-seriate of 10 paleæ, the margin hyaline below the middle, barbellate above. 49. HOCHSTETTERIA.

SERIES II. **LIGULIFLOREÆ.** *Flowers all ligulate. Juice milky.*

TRIBE X. **CICHORIEÆ.** Heads homogamous. Corollas all ligulate; ligules truncate, 5-toothed. Anther-bases sagittate, rarely tailed. Style-arms slender. Pappus setose, paleaceous or 0. Leaves radical or alternate, never opposite. Herbs.

Subtribe 1. LACTUCEÆ. Herbs rarely shrubby below, glabrous or with simple hairs. Innermost involucre-bracts subequal, the outer shorter, often very short. Achenes usually more or less contracted at the base, attenuated or beaked at the apex, sometimes columnar and truncate at both ends, rarely winged.

Achenes compressed, beaked ..... 50. LACTUCA.
Achenes compressed, not beaked ..... 51. SONCHUS.
Achenes columnar, truncate at both ends ... 52. LAUNÆA.

1. **CENTRATHERUM,** Cass.

Erect or diffusely branched herbs. Leaves alternate, petiolate, usually toothed. Heads homogamous, pedunculate, many-flowered, solitary, terminal or leaf-opposed, rarely corymbose. Involucre subhemispheric; bracts ∞-seriate, imbricate, the inner dry or scarious, the outer herbaceous, often leafy. Receptacle flat, naked or pitted. Corollas purple, all tubular, equal; tube slender; limb narrowly 5-fid. Anthers sagittate at the base; auricles obtuse. Style-arms subulate, hairy. Pappus scanty or copious, short, fugacious. Achenes obtuse, with 8–10 more or less prominent ribs.—DISTRIB. Asia, America, and Australia; species 10.

Leaves white beneath; outer involucre-bracts large, often leafy.
Outer involucre-bracts cordate at base; pappus equalling the corolla-tube ..... 1. *C. Ritchiei.*

Outer invol.-bracts not cordate at base; pappus shorter than the corolla-tube.	
Achenes $\frac{1}{8}$ in. long, deeply ribbed	2. *C. phyllolænum.*
Achenes $\frac{1}{16}$–$\frac{1}{12}$ in. long, faintly ribbed	3. *C. tenue.*
Leaves not white beneath; outer invol.-bracts shorter than the inner	4. *C. Hookeri.*

1. **Centratherum Ritchiei,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 228. An erect herb 15–24 in. high; stem scarcely branched, grooved, glabrous or with a few minute bristles. Leaves $2\frac{3}{4}$-$3\frac{1}{2}$ by $1\frac{1}{4}$–2 in., elliptic or elliptic-lanceolate, acute or acuminate, sparsely clothed above with short thick hairs, white with a soft woolly tomentum beneath, the margins regularly spinous-toothed, base tapering; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long, with a few stout hairs. Heads solitary, axillary and terminal, $\frac{1}{3}$–$\frac{1}{2}$ in. in diam., on slender peduncles. Outer invol.-bracts 2–6, large, leafy, cordate at the base, tipped with a short spine, white-tomentose beneath; innermost bracts linear, subacute, usually tipped with purple, scarious. Pappus reddish, equalling the corolla-tube. Achenes $\frac{1}{16}$–$\frac{1}{12}$ in. long, oblong-obovoid, 10-ribbed, glabrous. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647. *C. courtallense*, C. B. Clarke, Comp. Ind. p. 3 (*not* of Benth. & Hook. f.).—Flowers: Nov.

Rare. S. M. Country: Londa, *Cooke*! Kanara: Jagalbet, *Ritchie*, $\frac{1799}{3}$! Goa: *Woodrow*.—Distrib. Apparently endemic.

2. **Centratherum phyllolænum,** *Benth. ex Hook. f. Fl. B. I.* v. 3 (1881) p. 228. An erect branched variable annual; stems and branches glabrate or rough with minute bristles, often tomentose at the apex, frequently tinged with purple. Leaves 2–6 by 1–$2\frac{3}{4}$ in., elliptic, acute or acuminate, irregularly spinous-serrate or spinous-dentate, clothed with short setæ above, densely covered with white woolly tomentum beneath, base tapering into a short petiole. Heads $\frac{1}{2}$–$\frac{7}{8}$ in. in diam., solitary, axillary and terminal. Outer invol.-bracts 1–∞, spreading or deflexed, linear or lanceolate (rarely oblong), sometimes much longer than the heads, white beneath; intermediate bracts shorter than the inner, variable, obtuse, acute or rounded, erect or recurved, the margins often ciliate; innermost bracts scarious, often purple, linear-oblong, acute. Pappus pale-red, stiff, shorter than the corolla-tube. Achenes oblong, $\frac{1}{8}$ in. long, deeply 10-ribbed, glabrous. C. B. Clarke, Comp. Ind. p. 4; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647. *D caneurum molle*, Dalz. & Gibs. p. 122 (*not* of DC.).—Flowers: Sept.–Oct.

Konkan: *Law*! Ooran, *Dalzell*!; Marmagao, *Cooke*!; Parel, *Woodrow*! S. M. Country: Belgaum, *Ritchie*, $\frac{1799}{2}$! Kanara: Jagalbet (N. Kanara), *Ritchie*, $\frac{1799}{2}$ Gujarat: Páli, *Kanitkar*!—Distrib. India (W. Peninsula, Mt. Abu).

3. **Centratherum tenue,** *C. B. Clarke, Comp. Ind.* (1876) p. 4. Erect, dichotomously branched, 3–5 ft. high; stem and branches glabrous, slender, often tinged with purple. Leaves: the upper sessile and smaller than the lower; lower petioled, 4–6 by $1\frac{3}{4}$-$2\frac{1}{2}$ in., broadly elliptic-lanceolate, acute or acuminate, with short stiff hairs above, clothed beneath with a white woolly tomentum, the margins irregularly serrate, the serratures ending in a short stout bristle, base attenuated; petioles of the upper leaves 0, those of the lower short with a few bristly hairs at the base. Heads $\frac{1}{3}$–$\frac{1}{2}$ in. in diam.; peduncles slender, pubescent; flowers purple. Outer invol.-bracts 1 or 2, large, leafy,

usually longer than the head of flowers, oblong-lanceolate, acute, white-tomentose beneath, pointed with a bristle; intermediate bracts smaller than the inner, linear, acute or rounded at the apex, bristle-pointed, white-tomentose; the innermost bracts linear-oblong, subacute, scarious, white-tomentose, sometimes reflexed. Pappus pale-reddish (sometimes almost white), much shorter than the corolla-tube. Achenes $\frac{1}{16}$ $\frac{1}{12}$ in. long, oblong, faintly 10-ribbed, glabrous. Fl. B. I. v. 3, p. 228; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647. *Decaneurum lilacinum*, Dalz. & Gibs. Bo. Fl. p. 314.—Flowers: Oct.-Nov.

KONKAN: *Law*!, *Lambert*! DECCAN: Mahableshwar, *Cooke*!; Warra Ghát, *Cooke*!; Khandala, *Cooke*!—DISTRIB. India (W. Peninsula).

4. **Centratherum Hookeri,** *C. B. Clarke, Comp. Ind.* (1876) p. 3. Stem herbaceous, erect, 18–24 in. high, ashy-pubescent, angled and grooved. Leaves scattered, 2–3 by $\frac{1}{4}$–$\frac{1}{2}$ in., linear-lanceolate, acute, obscurely toothed, faintly pubescent on both sides, not white beneath; petioles very short. Heads $\frac{1}{2}$–$\frac{3}{4}$ in. in diam., subcorymbose; peduncles hoary-pubescent; flowers red. Outer invol.-bracts shorter than the inner, ovate-oblong, subacute, densely pubescent; intermediate bracts longer than the outer but shorter than the innermost, linear, with reflexed tips; the innermost longest of all, linear, scarious, with reflexed tips, Pappus dirty-straw-colored, longer than the corolla-tube, rigid, deciduous. Achenes $\frac{1}{8}$ in. long, linear-oblong, 10-ribbed. Fl. B. I. v. 3, p. 228; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647.—Flowers: Nov.

Stocks without locality in Herb. Kew.! KONKAN: *Law*! DECCAN: Poona, *Woodrow*!—DISTRIB. India (W. Peninsula).

2. LAMPRACHENIUM, Benth.

An erect branched annual with crisped hairs. Leaves alternate, petiolate, toothed, clothed beneath with white tomentum. Heads small, laxly subcorymbosely paniculate, homogamous. Involucre subcampanulate; bracts ∞-seriate, dry, the inner acute. Receptacle flat, naked. Corollas purple, all tubular, equal, regular; tube slender; limb narrowly 5-fid. Anthers obtusely auricled. Style-arms subulate, hairy. Pappus-hairs few, short, fugacious, red. Achenes obovoid, slightly compressed, shining, not ribbed, quite glabrous.—DISTRIB. Peninsular India; species 1.

1. **Lamprachenium microcephalum,** *Benth. in Benth. & Hook. f. Gen. Pl.* v. 2 (1873) p. 226. An erect herb 1–2 ft. high; stem simple or branched, glabrous, hairy or glandular, often tinged with purple. Leaves 2–3 by 1–1½ in., elliptic, acuminate, sparsely clothed with short bristly hairs above, densely covered with white woolly tomentum beneath, distantly bristle-serrate, tapering at the base; petioles $\frac{3}{8}$–$\frac{3}{4}$ in. long. Heads small, $\frac{3}{16}$–$\frac{1}{3}$ in. in diam., numerous, on slender hairy peduncles. Invol.-bracts elliptic-lanceolate, cuspidate, white-tomentose on the back; the exterior foliaceous at the tip, erect or recurved, acute, with densely ciliate margins; the interior a little longer, scarious, villous. Pappus reddish, equalling the corolla-tube, rigid. Achenes $\frac{1}{12}$ $\frac{1}{10}$ in. long, obovoid, turgid, slightly compressed, smooth, shining. Fl. B. I. v. 3, p. 229; C. B. Clarke, Comp. Ind. p. 5; Woodr. in Journ. Bomb.

Nat. v. 11 (1898) p. 647 ; Watt, Dict. Econ. Prod. v. 4, p. 586. *Decaneurum microcephalum*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 231 ; Dalz. & Gibs. p. 122.—Flowers : Oct.–Nov. VERN. *Brahmadandi.*

Stocks, Dalzell, without localities, in Herb. Kew. ! DECCAN : Mahableshwar, *Cooke* !, *Woodrow* ! S. M. COUNTRY : *Dalzell & Gibson.*

The plant is abundant at Mahableshwar, where I have frequently gathered it ; but I have never noticed the odor of chamomile mentioned by Dalzell & Gibson.

3. **ADENOON,** Dalzell.

An erect rigid herb. Leaves alternate, sessile. Heads pale-purple with intensely colored anthers, in moderate-sized corymbosely paniculate homogamous heads. Involucre campanulate ; bracts many-seriate, imbricate, oblong-lanceolate, aristate, the outer gradually shorter. Receptacle flat, minutely fimbriate. Corollas all tubular, equal, slender ; limb narrowly 5-fid. Anther-bases sagittate, subcaudate. Style-arms subulate, hairy. Pappus 0. Achenes 10-ribbed, obovoid, obtuse, subcompressed.—DISTRIB. India (W. Peninsula) ; species 1.

1. **Adenoon indicum,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 344. An erect glandular herb 1½–2½ ft. high. Stem simple below, branched above, angled and grooved, leafy, the lower part smooth or nearly so often tinged with purple, the upper part scabrid and hispid. Leaves thick, 2–3½ by 1–2 in., alternate, sessile, broadly elliptic or obovate, acute at both ends, coarsely and irregularly serrate, rough on both sides with short, usually bulbous hairs, light green above, paler beneath and with many prominent nerves. Heads ½–⅔ in. in diam., in corymbose panicles ; flowers purple ; peduncles hirsute ; bracts at the forks and below the flower-heads linear-lanceolate, mucronate. Invol.-bracts elliptic-oblong, aristate, hairy on the back, 3-nerved, glandular. Pappus 0. Achenes $\frac{1}{12}$–$\frac{1}{10}$ in. long, with 10 stout ribs, glandular between the ribs. Fl. B. I. v. 3, p. 229 ; Dalz. & Gibs. p. 121 ; C. B. Clarke, Comp. Ind. p. 5 ; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647. *Ethulia* ——?, Grah. Cat. p. 101.—Flowers : Sept.–Oct. VERN. *Motha-sunki.*

KONKAN : Amboli Ghát, *Cooke* ! DECCAN : Phunda Ghát, *Dalzell* ! ; Mahableshwar, *Cooke* !, *Woodrow* ! S. M. COUNTRY : Belgaum, *Law* ex *Graham* ; Castlerock, *Cooke* ! ; Párva Ghát, *Ritchie*, 1805 ! KANARA : Timai (N. Kanara), *Woodrow.*—DISTRIB. India (W. Peninsula).

4. **VERNONIA,** Schreb.

Herbs or shrubs. Leaves simple, alternate, entire or toothed. Heads terminal or axillary, homogamous, cymose or panicled. Involucre ovoid, globose or hemispheric, equalling or shorter than the flowers ; bracts in many series, the inner longest. Receptacle naked or pitted, sometimes shortly hairy. Corollas all equal, regular, tubular, slender ; lobes 5, narrow. Anther-bases obtuse. Style-arms subulate, hairy. Pappus usually 2-seriate of many hairs, often girt with a row of outer short hairs or flattened bristles. Achenes striate, ribbed or angled, rarely terete.—DISTRIB. Chiefly tropical, mostly American ; species about 280.

Achenes pubescent or silky.	
Achenes not ribbed.	
Herbaceous; achenes $\frac{1}{20}$ in. long, appressedly pubescent.	1. *V. cinerea.*
Shrubby; achenes $\frac{1}{10}$ in. long, densely silky	2. *V. cinerascens.*
Achenes ribbed, $\frac{1}{16}$ $\frac{1}{4}$ in. long, pubescent	3. *V. anthelmintica.*
Achenes glabrous or glandular between the ribs, not pubescent nor silky.	
Leaves thin, membranous, scabrid or pubescent (not tomentose) beneath	4. *V. divergens.*
Leaves thick, coriaceous, densely woolly-tomentose beneath.	5. *V. indica.*

1. **Vernonia cinerea,** *Less. in Linnæa*, v. 4 (1829) p. 291. Annual, erect, 6–30 in. high; stem stiff, cylindric, striate, more or less pubescent, slightly branched. Leaves petioled, 1–2 by $\frac{3}{4}$–$1\frac{1}{2}$ in. (the upper leaves the smallest), variable in shape, broadly-elliptic or lanceolate, obtuse or acute, shortly mucronate, more or less pubescent on both sides, irregularly toothed or shallowly crenate-serrate; petioles variable, $\frac{1}{4}$–$\frac{1}{2}$ in. long. Heads small, about 20-flowered, $\frac{1}{4}$ in. in diam., in lax divaricate terminal corymbs, with a minute linear bract beneath each head of flowers and with small bracts in the forks of the peduncles; flowers pinkish-violet. Invol.-bracts linear-lanceolate, awned, silky on the back. Pappus white, the exterior row short, about $\frac{1}{50}$ in. long. Achenes $\frac{1}{20}$ in. long, oblong, terete (not ribbed), slightly narrowed at the base, clothed with appressed white hairs. Fl. B. I. v. 3, p. 233; Grah. Cat. p. 96; Dalz. & Gibs. p. 121; C. B. Clarke, Comp. Ind. p. 20; Trim. Fl. Ceyl. v. 3, p. 7; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647; Watt, Dict. Econ. Prodr. v. 6, part 4, p. 231.—Flowers: Jan.–Feb. VERN. *Sahadevi.*

KONKAN: *Stocks*!, *Lambert*!; Matheran, *Cooke*! DECCAN: Poona, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 1091! KANARA: *Thomson*!; Kála naddi, *Ritchie*, 1091! SIND: Táta district, *Bhola Puran*!—DISTRIB. Throughout India; Tropical Asia, Africa, and Australia.

A common weed throughout the Presidency. Growing as it does in various situations and under varying conditions of moisture and soil, the plant is naturally a somewhat variable one.

2. **Vernonia cinerascens,** *Schultz-Bip in Schweinf. Fl. Aethiop.* (1867) p. 162. Shrubby, 1–3 ft. high, clothed with ashy pubescence; stems branched, terete, ashy-pubescent, rather slender, grooved. Leaves sessile, $\frac{3}{4}$–2 by $\frac{3}{16}$–$\frac{3}{8}$ in., oblong-spathulate, rounded or obtuse at the apex, apiculate, ashy-pubescent on both sides, entire or with a few teeth. Heads $\frac{1}{4}$ in. in diam., shortly stalked, or the uppermost sessile or nearly so on the branches of a corymbose panicle. Invol.-bracts linear-oblong, obtuse or subacute, sometimes apiculate, pubescent, usually tinged with purple, the outer much the smallest. Corollas purple, glabrous. Pappus shorter than the corolla, about $\frac{1}{6}$ in. long, white when mature, persistent; hairs of the outer row numerous, rigid. Achenes $\frac{1}{10}$ in. long, densely silky, slightly tapering at the base. Fl. B. I. v. 3, p. 237; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647; Oliver, Fl. Trop. Afr. v. 3, p. 275.—Flowers: Oct.–Dec.

SIND: *Dalzell*, 45!, *Bhola Puran*!; Karachi, *Woodrow*; Jemadar ka Landa, near Karachi, *Stocks*!—DISTRIB. India (Panjáb, Peshawar, Salt Range, Wazaristan); Beluchistan, Tropical Africa.

3. **Vernonia anthelmintica,** *Willd. Sp. Pl.* v. 3 (1800) p. 1634. Annual, robust, erect, leafy; stems 2–3 ft. high, branched, pubescent.

Leaves 2–3½ by 1–1¼ in., lanceolate or elliptic-lanceolate, acute, coarsely serrate, more or less pubescent on both sides, base tapering into the petiole. Heads ½–¾ in. in diam., subcorymbose, many- (about 40-) flowered, with a linear bract near the top of the peduncle. Outer invol.-bracts linear, hairy, herbaceous, shorter than those of the inner rows; intermediate bracts with herbaceous hairy tips, linear, acute or subobtuse, often constricted at the base of the herbaceous part, equalling or shorter (rarely longer) than the innermost; innermost bracts usually the longest, linear, subacute, scarious, often tipped with purple. Pappus reddish, the exterior row very short, subpaleaceous, persistent, the inner hairs somewhat flattened, deciduous, much shorter than the glabrous corollas. Achenes $\frac{3}{16}$–¼ in. long, oblong-cylindric, 10-ribbed, pubescent. Fl. B. I. v. 3, p. 236; Grah. Cat. p. 96; Dalz. & Gibs. p. 313; C. B. Clarke, Comp. Ind. p. 10; Trim. Fl. Ceyl. v. 3, p. 9; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647; Watt, Dict. Econ. Prod. v. 6, part 4, p. 229.—Flowers: Dec.–Feb. VERN. *Kadu-kárlá*; *Kadu-jire*.

Common in the black soil of the Deccan. DECCAN: Poona, *Cooke*!, *Woodrow*! S. M. COUNTRY: Dharwar, *Ritchie*, 1806! KANARA: Yellur, *Ritchie*, 1806!—DISTRIB. Throughout India, often cultivated; Ceylon.

The achenes are largely used in native medicine. The plant roasted in a room or powdered and thrown about the room is supposed to expel fleas; hence it is known as the *Purple Flea-Bane*. See Watt, Dict. Econ. Prod. l. c.

4. **Vernonia divergens,** *Edgew. in Journ. As. Soc. Beng.* v. 21 (1853) p. 172 (incorrectly printed *Vemonia*). Shrubby, perennial, 4–6 or sometimes 8 ft. high; branches diverging, pubescent. Leaves 2–6 by 1–3 in., elliptic, acute, serrate, scabrid above, pubescent or tomentose beneath, base tapering; main nerves very prominent on the lower side, with reticulate veins between; petioles ⅛–⅜ in. long. Flowers purple, usually in dense much-branched rounded corymbs. Heads small, 8–12-flowered, usually clustered at the apices of the ultimate branches. Invol.-bracts few, in few series, with greenish tips, oblong-obtuse (rarely subacute), sometimes apiculate, the outer ovate, smaller than the inner, all nearly glabrous or pubescent or sometimes clothed with white wool. Corolla glabrous. Pappus reddish or dirty-white, the outer ring of hairs consisting of very few, soon deciduous. Achenes ⅛ in. long, strongly 10-ribbed, glabrous or glandular between the ribs (not pilose), truncate at the apex, tapering towards the base. Fl. B. I. v. 3, p. 234; C. B. Clarke, Comp. Ind. p. 14; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647. *Eupatorium divergens*, Dalz. & Gibs. p. 123.—Flowers: Dec.–Feb. VERN. *Bundar*.

KONKAN: *Stocks*!, *Law*!; Matheran, *H. M. Birdwood*. DECCAN: Khandala, *Cooke*!; Párghát, *Graham*; Mahableshwar, *H. M. Birdwood*. S. M. COUNTRY: hills east of Belgaum, *Ritchie*, 1800! KANARA, *Stocks*!, *Mrs. Ward*!; Kála naddi, *Ritchie*, 1800!; Sirsi, *Woodrow*. GUJARAT: Dangs, *Woodrow*, 16!—DISTRIB. India (Behar, Central India, W. Peninsula, Rangoon, Birma).

Some of the Bombay specimens have densely woolly invol.-bracts, but I find the character insufficiently constant to make a good variety. I have seen both woolly and glabrous bracts on the same specimen.

5. **Vernonia indica,** *C. B. Clarke, Comp. Ind.* (1876) p. 16. An undershrub 3–6 ft. high; stem erect, not much branched, the stem, branches, underside of leaves, and inflorescence densely clothed with soft woolly whitish tomentum. Leaves 4–6 by 1½–3¼ in. (the upper

smaller), subsessile, elliptic-oblong, acute, sharply serrate, scaberulous above, densely clothed with white tomentum beneath; main nerves 8–10 pairs, prominent beneath; petioles 0 or sometimes ¼ in. long, broad at the base. Heads ¼ in. in diam., 8–12-flowered, crowded at the ends of the stout branches of corymbose panicles, with linear-lanceolate tomentose bracts beneath the branches of the panicle. Involucre-bracts elliptic-oblong, obtuse, purple-tipped, mucronate with a short black point, densely tomentose on the back, the outer the smallest. Corollas glabrous, reddish-purple. Achenes 10-ribbed, glabrous, $\frac{1}{12}$–$\frac{1}{10}$ in. long. Pappus yellowish, as long as the corolla; hairs of the outer row short, very deciduous, apparently 0 when the flowers are mature. Fl. B. I. v. 3, p. 238; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647. *Decaneurum dendigulense*, DC. in Wight, Contrib. (1834) p. 7; Prodr. v. 5, p. 67.—Flowers: Oct.

Deccan: Panchgani, *Woodrow*!; Mahableshwar, *Cooke*!; Mawal districts, *Woodrow*. S. M. Country: sandstone low open hills east of Belgaum, *Ritchie*, 369! Kanara: *Stocks*!—Distrib. India (hills of the W. Peninsula).

Vernonia arborea, Ham. in Trans. Linn. Soc. v. 14 (1825) p. 218. A tree reaching 40 ft. high; branches tomentose. Leaves 5–8 by 2–3 in., densely woolly beneath. Flowers pale-violet or white. Fl. B. I. v. 3, p. 239; Grah. Cat. p. 96; Trim. Fl. Ceyl. v. 3, p. 11; Talb. Trees Bomb. ed. 2, p. 200.

Occasionally grown in gardens, having been introduced probably from Bengal. It has not been found wild in the Bombay Presidency.

5. **ELEPHANTOPUS,** Linn.

Rigid usually perennial herbs. Leaves alternate. Flowers in homogamous heads of 2–5 flowers, collected into a head-like cluster. Involucre oblong, compressed; bracts about 8 in 2 rows, the outer the shorter. Receptacle small, naked. Corollas equal, subregular or most commonly subpalmately spreading from the inner side, being deeply cleft; lobes 5, narrow. Anthers sagittate at the base, with obtuse auricles. Style-arms subulate, minutely hairy. Achenes truncate at the apex, 10-ribbed. Pappus-bristles 1–2-seriate, rigid, shining, slender and dilated below or chaff-like.—Distrib. Chiefly Tropical American; species 10–12.

1. **Elephantopus scaber,** *Linn. Sp. Pl.* (1753) p. 814. Erect, 6–15 in. high; rootstock short, giving off many stout fibrous roots; stem usually dichotomously branched, strigose, with appressed white hairs. Leaves mostly radical, 5–8 by 1½–2¼ in., forming a spreading rosette on the ground, obovate-oblong, rounded or subacute, coarsely serrate-dentate, more or less hairy on both surfaces, base tapering into an obscure petiole; main nerves numerous, prominent beneath, with reticulate veins between; cauline leaves smaller than the radical, sessile or nearly so. Heads numerous, sessile, closely packed, forming a large flat-topped terminal inflorescence nearly 1 in. across and surrounded at the base by 3 large stiff broadly-ovate cordate conduplicate conspicuously-nerved leafy bracts. Involucre-bracts in 2 series enclosing 4 flowers; bracts of the outer row half as long as those of the inner, 1-nerved; bracts of the inner row usually 3- (rarely 5-) nerved, scarious, linear,

cuspidate. Corolla violet, exserted; tube long, slender; limb deeply cleft on one side, causing the 5 linear lobes to present a palmate appearance. Style much exserted, the arms recurved. Pappus white, 1-seriate, consisting of 5 (rarely 4) rigid bristles dilated at the base. Achenes ⅓ in. long, truncate, finely 10-ribbed, slightly pubescent. The embryo sometimes germinates in the head (*C. B. Clarke*). Fl. B. I. v. 3, p. 242; Grah. Cat. p. 96; Wight, Icon. t. 1086; Dalz. & Gibs. p. 122; Clarke, Comp. Ind. p. 28; Trim. Fl. Ceyl. v. 3, p. 12; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647; Watt, Dict. Econ. Prodr. v. 3, p. 208. —Flowers: Sept.–Nov. VERN. *Hastipata.*

Common under the shade of trees in the Konkan and on the Ghâts. KONKAN: Mahim woods near Bombay, *Graham*; Parel and Malabar hill, *Graham*; Matheran, *H. M. Birdwood, Woodrow*! DECCAN: Lanoli, *Cooke*!; Koina valley, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 1097!; Londa, *Cooke*! GUJARAT: Bulsad, *Kanitkar*!—DISTRIB. Throughout India; Tropical Asia, Australia, and America.

6. **ADENOSTEMMA,** Forst.

Annual glabrous or glandular-pubescent herbs. Leaves usually opposite. Heads homogamous, paniculate or corymbose. Involucre campanulate; bracts many, equal, in 2 rows, herbaceous, sometimes connate. Receptacle flat, pitted. Corollas all tubular, regular; tube short; limb 5-toothed. Anthers truncate, with a glandular tip, base obtuse. Style-arms large and long, clavate. Pappus-hairs 3–5, short, rigid, often clavate, inserted on a short ring. Achenes compressed, truncate, 5-angled, usually glandular.—DISTRIB. 5 or 6 American species; 1 species cosmopolitan.

1. **Adenostemma viscosum,** *Forst. Char. Gen.* (1776) p. 90. An erect (rarely decumbent) branched annual 1–3 ft. high, glabrous below, glandular-pubescent above; stems tinged with purple. Leaves very variable, the lower opposite, the upper often alternate, 3–7 in. long, from oblong or oblong-lanceolate to broadly ovate, subacute, coarsely serrate-dentate, usually cuneate and then narrowed into a long tapering base; petioles obscure. Heads few or many, in lax or dense panicles, with linear bracts at the forks. Involucre hemispheric; bracts linear-oblong, obtuse or subacute, glabrous, glandular or scabrid. Corolla-tube short, glandular-hairy and viscous outside; lobes 5, small, acute. Style-arms twice as long as the corolla, much exserted. Achenes ⅛-¼ in. long, 5-angled, obtuse, compressed, glabrous or glandular-scabrid, blackish-brown, crowned with a narrow ring from which issue 4 or 5 glandular setæ (*pappus*). Fl. B. I. v. 3, p. 242; Grah. Cat. p. 98; C. B. Clarke, Comp. Ind. p. 28; Trim. Fl. Ceyl. v. 3, p. 13; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647. *Adenostemma latifolium*, Don, Prodr. Nep. p. 181; Wight, Icon. t. 1087; Dalz. & Gibs. p. 122. *A. rivale*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 231; Dalz. & Gibs. p. 122.—Flowers: Sept.–Feb.

The leaves vary much with soil and situation, the variation being very marked when the plants grow near water. Mr. C. B. Clarke (*l. c.*) mentions a number of varieties, most of which were formerly classed as species, but says that he cannot separate any of them by good characters. Trimen, Fl. Ceyl. (*l. c.*), is of opinion that the numerous species proposed are not worth distinction even as varieties.

KONKAN: *Law!*; margins of rivulets near Rohe, *Dalzell & Gibson.* DECCAN: common at Mahableshwar in shady woods, *Cooke!* S. M. COUNTRY: Castlerock, *Bhiva!* KANARA: marshy ground near Jagalbet (N. Kanara), *Ritchie,* 1807!—DISTRIB. Throughout India; Ceylon.

7. AGERATUM, Linn.

Erect herbs or undershrubs. Leaves opposite or the upper alternate. Heads homogamous, in dense corymbs or lax panicles; flowers blue, purple or white. Involucre campanulate; bracts 2–3-seriate, linear, subequal. Receptacle flat, or nearly so, naked or with caducous scales between the flowers. Corollas all tubular, regular, the tube scarcely distinct from the shortly 5-fid limb. Anthers appendiculate at the apex, obtuse at the base. Style-arms elongate, obtuse. Pappus of 5 short free or connate scales or of 10–20 narrow unequal scales. Achenes 5-angled.—DISTRIB. All probably American, but 1 species widely distributed throughout the Tropics; species about 16.

1. **Ageratum conyzoides,** *Linn. Sp. Pl.* (1753) p. 839. Annual, 1-3 ft. high; stem erect, branched, terete, more or less hairy. Leaves opposite or the upper alternate, 2–3 by 1–2 in., broadly ovate, subacute, crenate and with ciliate margins, more or less hairy on both sides, base cuneate; petioles 1–1¼ in. long, hairy. Heads small, in dense terminal corymbs; flowers pale-blue or white, malodorous. Invol.-bracts linear, very acute, ribbed on the back, ciliolate and with scarious margins. Pappus of 5 scales, aristate, dilated at the base, serrulate, about eqnalling the corolla. Achenes $\frac{1}{12}$–$\frac{1}{10}$ in. long, sharply angled, sometimes glandular, attenuated at the base, black. Fl. B. I. v. 3, p. 243; Grah. Cat. p. 98; C. B. Clarke, Comp. Ind. p. 30; Trim. Fl. Ceyl. v. 3, p. 13; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647.—Flowers: Nov.–Mar. VERN. *Osádi*; *Sahadevi.*

Naturalized in the Bombay Presidency, where it is common in the Deccan. It is abundant in Ceylon, where it has become a very troublesome weed, and is known among the planters as *Goat-Weed* from its peculiar odor. DECCAN: Poona, *Woodrow!*, *Cooke!*; Kirki, *J. Woodrow!* S. M. COUNTRY: Belgaum, *Ritchie,* 393!—DISTRIB. Throughout India: all hot countries.

8. DICHROCEPHALA, DC.

Annual branched glabrous or pubescent herbs. Leaves alternate, toothed, lyrate, or pinnatifid. Heads small, panicled, heterogamous, globose or hemispheric; outer flowers ♀, slender, ∞-seriate, fertile; disk-flowers ☿, fertile. Involucre small; bracts sub-2-seriate, slightly unequal and with dry margins. Receptacle slightly contracted within the margin, elevated, the top flat, naked. Corollas of the ♀ flowers slender, rigid, minutely 2–3-toothed, or expanded into a 3–4-fid limb; corollas of ☿ flowers regular, tubular, with a narrowly campanulate 4–5-toothed limb. Anther-bases truncate. Style-arms of ☿ flowers short, flattened, tips lanceolate. Pappus 0 or in ☿ flowers rarely of 2 or 3 minute bristles. Achenes compressed, with a thickened margin. —DISTRIB. Asia and Africa; species 5.

1. **Dichrocephala latifolia,** *DC. in Wight, Contrib.* (1834) p. 11. An annual weed 6 in. to 2 ft. high; stem usually divaricately branched, pubescent. Leaves very variable, 2–3 by 1–1½ in., alternate, obovate or

broadly ovate, subacute, often pinnatifid with a large ovate terminal lobe and 1 or 2 pairs of small lateral ones, all coarsely crenate-serrate, sparsely hairy on both sides; nerves prominent beneath; petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long, hairy. Heads $\frac{1}{3}$–$\frac{1}{6}$ in. in diam., few, globose, panicled; pedicels long, each often with a linear acute bract above or below the middle. Involucre-bracts minute, linear, with scarious margins. Corollas of inner or disk-flowers yellow, 4- (less commonly 5-) toothed; those of the outer flowers filiform, curved, pink or purplish, usually obscurely 2-toothed. Pappus of ♀ flowers 0, of ☿ flowers of 2 or 3 bristles. Achenes $\frac{1}{20}$–$\frac{1}{16}$ in. long, compressed, smooth. Fl. B. I. v. 3, p. 245: Dalz. & Gibs. p. 124; Wight, Icon. t. 1096; C. B. Clarke, Comp. Ind. p. 36; Trim. Fl. Ceyl. v. 3, p. 14: Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647.—Flowers: Aug.-Oct.

DECCAN: Máwal, *Woodrow*!; Mahableshwar, *Cooke*!; Panchgani, *Cooke*!, *Woodrow*! S. M. COUNTRY: Rámghát, *Dalzell & Gibson*, *Stocks*!; Belgaum, *Ritchie*, 389!—DISTRIB. India (N.W. Himalayas, Sikkim, Khasia, Cachar, Birma, W. Peninsula); Ceylon, Malaya, Persia, China, Africa.

9. CYATHOCLINE, Cass.

Erect annual branched herbs. Leaves alternate, pinnatisect. Heads small, heterogamous, in small panicles at the apices of the branches. Outer flowers ♀, fertile, ∞-seriate; inner or disk-flowers ☿, usually sterile, regular, 5-cleft. Involucre hemispheric; bracts sub-2-seriate, lanceolate, acute, with scarious margins, slightly unequal. Receptacle with a contracted base, elevated, top concave, naked. Corollas of ♀ flowers filiform, usually 2-toothed. Corollas of ☿ flowers regular, tubular, the limb narrowly campanulate, 5-fid. Anther-bases truncate. Style exserted, that of the ☿ flowers simple or cleft. Pappus 0. Achenes very small, oblong, smooth.—DISTRIB. East Indies; species 2.

1–2 ft. high; flowers purple	1. *C. lyrata.*
4–9 in. high; flowers yellow	2. *C. lutea.*

1. **Cyathocline lyrata,** *Cass. in Ann. Sc. Nat.* sér. 1, v. 17 (1829) p. 420. A slender delicate erect herb 1–2 ft. high; stems branched, grooved, more or less pubescent. Leaves sessile, 1–5 in. long, pinnatifid, the segments toothed, more or less pubescent. Flowers both of ray and disk rose-purple, in heads $\frac{1}{6}$ in. in diam., arranged in small rounded corymbose panicles. Involucre-bracts linear, acute, $\frac{1}{12}$–$\frac{1}{10}$ in. long, with scarious and densely ciliate margins. Corollas of ☿ flowers with 5 short ciliate teeth. Pappus 0. Achenes minute, oblong, smooth. Fl. B. I. v. 3, p. 246: Wight, Icon. t. 1098; C. B. Clarke, Comp. Ind. p. 37; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647. *Cyathocline Lawii*, Wight, in Calc. Journ. Nat. Hist. v. 7 (1847) p. 159 (*not* of Dalz. & Gibs.). *C. stricta*, DC. Prodr. v. 5 (1836) p. 374; Dalz. & Gibs. p. 124.—Flowers: Nov.-Mar.

Usually met with on the banks of streams and in moist localities. KONKAN: *Law*!, *Stocks*!; Banda, *Ritchie*, 386!; banks of streams, *Dalzell & Gibson*. DECCAN: Mahableshwar, *Cooke*!; river bank, Kirkee, *J. G. Woodrow*!; river bank, Poona, *Cooke*!; Sholapur, bank of Ekruk tank, *G. M. Woodrow*!; Máwal taluka, *G. M. Woodrow*. S. M. COUNTRY: Dharwar, *Cooke*! KANARA: Kála naddi, *Ritchie*, $\frac{386}{1}$!—DISTRIB. India (N.W. Himalayas, Oude, Behar, Central India, Chota Nagpur, Assam, Chittagong, Rangoon, Birma, W. Peninsula).

2. **Cyathocline lutea,** *Law ex Wight, in Calc. Journ. Nat. Hist.* v. 7 (1847) p. 158. A small herb 4–9 in. high; stem scape-like, very slender. Leaves sessile, glandular, ¾–1½ by $\frac{1}{10}$–⅛ in., bipinnatifid, mostly radical, forming a stellately spreading rosette; cauline leaves few, alternate. Heads ⅛–⅙ in. in diam., few, in branched corymbose panicles; flowers bright yellow. Invol.-bracts $\frac{1}{10}$ in. long, linear-oblong, subobtuse, hairy on the back. Pappus 0. Achenes about $\frac{1}{40}$ in. long, smooth. Fl. B. I. v. 3, p. 246; Wight, Icon. t. 1150. *Cyathocline flava,* C. B. Clarke, Comp. Ind. p. 37. *C. Lawii,* Dalz. & Gibs. Bo. Fl. p. 124 (*not* of Wight).—Flowers: Oct.–Jan.

KONKAN: *Law*! DECCAN: Máwal, *Woodrow*; Karli in rice-fields, *Woodrow*!; Lanoli, very abundant in a marshy place near the roadside, *Cooke*!—DISTRIB. Apparently endemic.

10. GRANGEA, Adans.

Prostrate or suberect villous herbs. Leaves alternate, pinnatifid. Heads subglobose, terminal or leaf-opposed, shortly peduncled, heterogamous; outer flowers ♀, fertile, 1–∞-seriate; those of the disk ☿, fertile. Involucre broadly campanulate; bracts few-seriate, slightly unequal, the exterior herbaceous. Receptacle convex or conical, naked. Corollas of ♀ flowers filiform, shorter than the styles, the exterior 2-fid at the apex, the interior sometimes 3–4-fid; corollas of ☿ flowers regular, with a slender tube and a campanulate limb 4–5-fid at the apex. Anther-bases obtuse. Style-arms of ☿ flowers flattened, cuneate, obtuse or with triangular points. Pappus a short tube with fimbriate mouth. Achenes somewhat compressed or subterete, produced at the apex into a cartilaginous ring.—DISTRIB. Tropical Asia and Africa; species 3 or 4.

1. **Grangea maderaspatana,** *Poir. Encyc. Méthod. Suppl.* v. 2 (1811) p. 825. Annual; stems many, prostrate, spreading from the centre, 4–12 in. long, hairy with soft white hairs. Leaves numerous, sessile, 1–2½ in. long, sinuately pinnatifid with 2–4 pairs of opposite or subopposite lobes smaller towards the base, the terminal lobe the largest, all coarsely serrate-dentate, pubescent on both surfaces. Heads globose, ¼–⅓ in. in diam., solitary or 2-nate, on short leaf-opposed peduncles; flowers yellow. Invol.-bracts elliptic, obtuse, rigid, densely pubescent. Pappus a short tube with fimbriate mouth. Achenes glandular, $\frac{1}{10}$ in. long including the pappus-tube. Fl. B. I. v. 3, p. 247; Dalz. & Gibs. p. 124; Wight, Icon. t. 1097; Aitch. Pb. & Sind Pl. p. 73; C. B. Clarke, Comp. Ind. p. 37; Trim. Fl. Ceyl. v. 3, p. 14; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647; Watt, Dict. Econ. Prod. v. 4, p. 175. —Flowers: Dec.–May.

KONKAN: Bombay, *Law*!; rice-fields, *Kanitkar*!; Panvel, *Kanitkar*! S. M. COUNTRY: Dharwar, *Bhiva*!; Belgaum, *Ritchie*, 412! KANARA: Kála naddi, *Ritchie*, 412! SIND: *Stocks*; Sukkur, *Woodrow*.—DISTRIB. Throughout India; Ceylon, Tropical and Subtropical Asia and Africa.

11. ERIGERON, Linn.

Perennial or annual herbs. Leaves alternate. Heads of flowers solitary or variously corymbose or panicled, heterogamous; ray-flowers ♀, usually 2–many-seriate, fertile; disk-flowers ☿, fertile (rarely sterile). Involucre hemispheric or campanulate; bracts sub-2-seriate,

narrow, usually numerous, slightly unequal. Receptacle flat or scarcely convex, naked or rarely foveolate. Corollas of the ♀ flowers violet-purple or white, the exterior narrowly ligulate, the interior sometimes tubular, filiform, scarcely dentate; corollas of ☿ flowers yellow, regular, tubular, the limb slightly enlarged, with 5 (rarely 4) short teeth. Anther-bases obtuse. Style-arms of ☿ flowers more or less flattened, the tips lanceolate. Pappus 1-seriate, of many long hairs, or sometimes 2-seriate, the outer row of a few short hairs or bristles. Achenes compressed, often narrow, the margins usually nerviform, the faces without nerves or with 1–2 nerves.—DISTRIB. Chiefly in the temperate regions of the world; species about 100.

1. **Erigeron asteroides,** *Roxb. Fl. Ind.* v. 3 (1832) p. 432. A coarse annual 1–2 ft. high; stem much-branched, clothed with spreading hairs. Leaves sessile (or the radical shortly petiolate), 1–2 in. long, oblong or obovate-oblong, those of the stem auriculate, ½-amplexicaul, obtuse, all toothed or lobulate, hairy on both sides. Heads ¼–½ in. in diam., few, on long peduncles. Involucre-bracts 1–2-seriate, subequal, very narrow, much shorter than the pappus, bristle-pointed and with scarious margins. Ray of 1–2 rows of ligulate bluish-violet spreading flowers, longer than the involucre-bracts, then several rows of filiform ♀ flowers appearing white in the fresh plant (*C. B. Clarke*); disk composed of yellow ☿ perfect flowers with tailless anthers. Pappus pinkish-white. Achenes much flattened, ellipsoid or slightly obovoid, $\frac{1}{30}$ in. long, glabrous or nearly so, yellowish. Fl. B. I. v. 3, p. 254; Trim. Fl. Ceyl. v. 3, p. 16; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647; Watt, Dict. Econ. Prod. v. 3, p. 256. *Erigeron hispidum*, DC. in Wight, Contrib. (1834) p. 9; C. B. Clarke, Comp. Ind. p. 54.—Flowers: Sept.–Nov. VERN. *Sonasali*; *Maredi*.

KONKAN: *Stocks*! DECCAN: Nasik, *Dalzell*!; Ahmednagar, *Cooke*!, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 394!—DISTRIB. Throughout India; Ceylon.

12. CONYZA, Less.

Annual or perennial herbs. Leaves alternate, entire, toothed or cut. Heads corymbose or panicled (rarely solitary), heterogamous, discoid. Outer flowers ♀, fertile, 2–∞-seriate, filiform (rarely ligulate), yellow; disk-flowers ☿, all or most of them fertile, yellow, tubular, the limb 5-toothed. Involucre campanulate; bracts 2–∞-seriate, imbricate, lanceolate or linear, sometimes very narrow, the outer smaller. Receptacle flat or somewhat convex, naked, or pitted and fimbriate. Anther-bases obtuse, entire. Style-arms of ☿ flowers flattened, usually narrow, with lanceolate tips. Pappus 1- (rarely 2-) seriate. Achenes small, compressed.—DISTRIB. Tropical and subtropical regions; species 50.

1. **Conyza stricta,** *Willd. Sp. Pl.* v. 3 (1800) p. 1922. Herbaceous, 1–2½ ft. high; stem erect, leafy, pubescent, often simple in the lower part, corymbosely branched near the apex, sometimes, though less commonly, branched from the base. Leaves numerous, subsessile, various, obovate, cuneate, spathulate or linear, irregularly toothed, hairy. Heads small, ⅛ in. in diam., very numerous, in dense terminal corymbs; flowers yellow; peduncles hairy, bracts below the heads and at the forks linear, acute, aristate. Involucre-bracts narrowly lanceolate,

aristate, sub-2-seriate, subequal, pubescent on the back. Pappus 1-seriate, at length reddish (*C. B. Clarke*). Achenes ovoid-oblong, compressed, $\frac{1}{25}$ in. long, with a few microscopical hairs or sometimes microscopically papillose. Fl. B. I. v. 3, p. 258; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *Conyza absinthifolia*, DC. in Wight, Contrib. (1834) p. 16; Grah. Cat. p. 97; Dalz. & Gibs. p. 124; C. B. Clarke, Comp. Ind. p. 64. *Conyza adenocarpa*, Dalz. in Dalz. & Gibs. Bo. Fl. p. 125.—Flowers: Oct.-Nov.

KONKAN: *Law*!, *Stocks*!, *Lambert*! DECCAN: Sinhagad hill, *Gangaram*!; Mahableshwar, *Cooke*!; Wada, below Mahableshwar, *Kanitkar*! S. M. COUNTRY: near Belgaum, *Law* ex *Graham*; Belgaum hills, *Ritchie*, 404!

I am unable by any distinctive characters to separate *Conyza adenocarpa*, Dalz., from the above. There is only 1 sheet of this plant in Herb. Kew., the specimens on which were apparently collected by Dalzell himself. It does not appear to have been found by any other collector, and Woodrow does not include it in his list of Bombay plants. I cannot find that the achenes are covered with waxy glands, as described by Dalzell & Gibson.

13. **BLUMEA**, DC.

Annual or perennial, glandular, pubescent or woolly herbs. Leaves alternate, usually toothed or lobed, sessile or petiolate, rarely decurrent. Heads of moderate size, solitary, panicled or fascicled, rarely racemose, heterogamous, disciform, purple, rosy or yellow. Outer flowers ∞-seriate, ♀, fertile; disk-flowers ☿, few, fertile (rarely sterile). Involucre ovoid or campanulate; bracts ∞-seriate, imbricate, narrow, acute, herbaceous or soft, the outer gradually smaller. Receptacle flat, naked. Corollas of ♀ flowers filiform, minutely 2-3-toothed, those of the ☿ flowers regular, tubular, slender, with a slightly enlarged 5-toothed limb. Anther-bases sagittate; tails usually slender. Style-arms of the ☿ flowers flattened or almost filiform, somewhat acute, papillose on the back, rarely connate so as to form one undivided style. Pappus slender, 1-seriate, usually caducous. Achenes small, subterete or angled, often ribbed, glabrous or pilose.—DISTRIB. Tropical and subtropical Asia, Africa, and Australia; species about 60.

Herbs. Leaves not reaching 6 in. long.
- Heads few, solitary, peduncled at the ends of the branches.
  - Involucral-bracts tipped with a long white bristle; pappus pink ..... 1. *B. amplectens.*
  - Involucral-bracts not tipped with a long bristle; pappus white ..... 2. *B. bifoliata.*
- Heads many, villous, small, in spiciform cymes or panicles.
  - Corollas purple ..... 3. *B. Wightiana.*
  - Corollas yellow.
    - Receptacle pubescent; achenes ribbed ..... 4. *B. glomerata.*
    - Receptacle glabrous; achenes not ribbed (the plants smell strongly of turpentine) ..... 5. *B. lacera.*
- Heads many, small, in peduncled open corymbs. Tall slender herbs.
  - Quite glabrous ..... 6. *B. virens.*
  - Pubescent ..... 7. *B. membranacea.*
- Heads few, $\frac{1}{4}$-$\frac{1}{3}$ in. in diam., in axillary and terminal corymbs, often clustered.
  - Prostrate herb with branches radiating from the root... 8. *B. oxydonta.*
  - Erect herb; heads $\frac{1}{4}$-$\frac{1}{3}$ in., in peduncled cymes ..... 9. *B. eriantha.*
  - Erect herb; heads $\frac{1}{3}$ in., axillary, sessile, solitary or clustered ..... 10. *B. Belangeriana.*

Heads ½–¾ in. in diam.
Leaves thick, obovate, densely woolly; receptacle glabrous ..... 11. *B. Malcolmii.*
Leaves membranous, lanceolate-oblong, pubescent or glabrous; receptacle pubescent ..... 12. *B. malabarica.*
A shrub 4–6 ft. high; leaves 6–10 in. long ..... 13. *B. spectabilis.*

1. **Blumea amplectens,** *DC. in Wight, Contrib.* (1834) p. 13. Annual, 10–15 in. high (except the var. *maritima* which is much higher); stems terete, divaricately branched, more or less hairy. Leaves ¾–2 by ¼–⅝ in., sessile, elliptic-oblong, acute, the young leaves villous, the older nearly glabrous, auricled at the base, ½-amplexicaul, regularly and sharply toothed, the upper teeth the smaller. Heads small, ¼–⅓ in. in diam., solitary, few, terminal; flowers yellow; peduncles hairy, often longer than the leaves. Corolla-lobes of ♀ flowers hairy. Involucral-bracts linear-subulate, densely pubescent, the inner row tipped with a long white bristle. Receptacle glabrous. Pappus pink. Achenes minute, about $\frac{1}{30}$ in. long, oblong, compressed, microscopically hairy. Fl. B. I. v. 3, p. 260; Dalz. & Gibs. p. 125; C. B. Clarke, Comp. Ind. p. 71; Trim. Fl. Ceyl. v. 3, p. 19; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: Dec. VERN. *Burambi.*

KONKAN: Bombay, *Woodrow.* GUJARAT: Vankanea (Kathiawar), *Cooke!*—DISTRIB. More or less throughout India; Ceylon.

VAR. 1. *tenella,* Hook. f. Fl. B. I. v. 3, p. 260 (not *Blumea tenella* of DC.). Nearly glabrous. Scarcely separable as a variety.

KONKAN: *Law!* DECCAN: Khandala, *Stocks!* GUJARAT: Surat, *Dalzell!*

VAR. 2. *maritima,* Hook. f. Fl. B. I. v. 3, p. 260. A dense bush 3–5 ft. high, glabrous, glandular. Leaves small. Heads large.

A littoral species. SIND: *Stocks,* 554!

2. **Blumea bifoliata,** *DC. in Wight, Contrib.* (1834) p. 14. Stem terete, branched from the base, erect or decumbent, more or less hairy. Leaves 1–3 by ½–1¼ in., elliptic or oblong, acute, sessile, slightly serrate, pubescent or pilose on both sides, the uppermost pair of leaves subopposite. Heads ¼–⅓ in. in diam., solitary; flowers yellow; peduncles rather long. Corolla-lobes of ♀ flowers hairy. Involucral-bracts hairy, linear, acute, the interior not caudate. Receptacle glabrous. Pappus white. Achenes narrowly oblong, with 4–5 slightly hairy angles. Fl. B. I. v. 3, p. 261; Dalz. & Gibs. p. 125; C. B. Clarke, Comp. Ind. p. 72; Trim. Fl. Ceyl. v. 3, p. 19.—Flowers: Dec.–Feb.

DECCAN: *Woodrow.* S. M. COUNTRY: Belgaum (north), *Ritchie,* 1815! GUJARAT: Surat, *Dalzell & Gibson.*—DISTRIB. India (Bengal, Birma, W. Peninsula); Ceylon, Malay Peninsula.

3. **Blumea Wightiana,** *DC. in Wight, Contrib.* (1834) p. 14. Stem erect, branched, 6–30 in. high; branches terete, villous. Leaves 1¼–4 by ⅝–2 in., elliptic, elliptic-lanceolate, or obovate, the lower petioled, the upper nearly sessile, irregularly toothed or serrate. Heads ¼ in. in diam., collected into terminal spiciform dense (rarely open) often interrupted cymes or panicles; flowers purple. Involucral-bracts narrowly linear, acuminate, the outer hairy. Receptacle glabrous. Anthers subincluded, caudate at the base. Corollas of ♀ flowers with

glandular lobes. Pappus shorter than the invol.-bracts. Achenes minute, oblong, 4–5-angled, not ribbed. Fl. B. I. v. 3, p. 261; C. B. Clarke, Comp. Ind. p. 74; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *B. holosericea*?, Dalz. & Gibs. p. 125 (*not* of DC.).—Flowers: Dec.–Jan.

Dalzell without locality in Herb. Kew.! KONKAN: Matheran, *Woodrow*. DECCAN: Poona, *Woodrow*.—DISTRIB. Throughout the plains of India.

4. **Blumea glomerata,** *DC. in Wight, Contrib.* (1834) p. 15. Pubescent or villous; stem herbaceous, erect, 1–4 ft. high, ashy-pubescent, especially in the upper part. Lower leaves petioled, obovate, often lyrate-pinnatifid, 4–5 in. long, coarsely serrate or sometimes entire; the upper leaves much smaller, sessile, oblong, inciso-serrate, all more or less hairy or pubescent on both sides. Heads ¼ in. in diam., in sessile fascicles along the branches often forming interrupted spikes; flowers yellow. Corolla-lobes of ♀ flowers pubescent. Receptacle pubescent. Invol.-bracts ashy-pubescent, the outer very small, the inner large, exceeding the flowers, very often purple. Achenes ribbed, sparingly hairy. Fl. B. I. v. 3, p. 262; Dalz. & Gibs. p. 125; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *Blumea fasciculata*, DC. Prodr. v. 5, p. 442; C. B. Clarke, Comp. Ind. p. 81.—VERN. *Bhámbhurda.*

KONKAN: *Dalzell & Gibson.*

This plant is included on the authority of Dalzell & Gibson. I have seen no specimens from the Bombay Presidency. There are none in Herb. Kew., and Woodrow in his list quotes Dalzell as the authority for its occurrence in the Konkan.

5. **Blumea lacera,** *DC. in Wight, Contrib.* (1834) p. 14. Annual, with a strong odor of turpentine; stem erect, 1–3 ft. high, ash-colored, usually densely glandular-pubescent. Leaves 1½–5 by ⅝–2½ in., the lower petioled, often incised or lyrate, the upper subsessile, elliptic-oblong or obovate, obtuse or subacute, finely silky-pubescent on both sides, sharply serrate-dentate, base much tapered. Heads ¼–⅓ in. in diam., numerous, in short axillary cymes and terminal spiciform panicles; flowers yellow. Corolla-lobes of ♀ flowers nearly glabrous. Invol.-bracts densely silky-villous, the outer bracts somewhat herbaceous, linear-lanceolate, the inner linear, scarious, with a green midrib. Receptacle glabrous. Pappus white. Achenes not ribbed, small, oblong, sub-4-gonous. Distinguished, when living, from *B. Wightiana* by its yellow flowers and by its odor. Fl. B. I. v. 3, p. 263; Grah. Cat. p. 97; C. B. Clarke, Comp. Ind. p. 76; Trim. Fl. Ceyl. v. 3, p. 19; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648; Watt, Dict. Econ. Prod. v. 1, p. 459. *Blumea leptocladea*, Dalz. & Gibs. p. 126 (*not* of DC.).—Flowers: Jan.–Apr. VERN. *Burando.*

KONKAN: *Stocks!, Nimmo* ex *Graham.* DECCAN: Poona, *Cooke!, G. M. Woodrow!*; Kirki, *J. G. Woodrow!*; Khandala, *Stocks!* KANARA: *Woodrow*; on the Kála naddi, *Ritchie,* 1816!—DISTRIB. Throughout the plains of India; Ceylon, China, Malaya, Tropical Africa.

VAR. *glandulosa*, Hook. f. Fl. B. I. v. 3, p. 263. Whole plant more or less glandular. *B. glandulosa* (sp.), DC. in Wight, Contrib. p. 14.

S. M. COUNTRY: Rámghát, *Ritchie,* 402!

6. **Blumea virens,** *DC. in Wight, Contrib.* (1834) p. 14. Erect, slender, 1–4 ft. high, much branched, glabrous; stem grooved, glabrous. Lower leaves sometimes reaching 5–5½ in. long, petioled, obovate, or often lyrate or runcinate, irregularly or sinuate-toothed, the upper leaves much smaller, elliptic-oblong, serrate, all glabrous or nearly so. Heads ¼ in. in diam., glabrous, on capillary glabrous peduncles, in open much-branched panicles with small leaves on the ascending branches; flowers yellow. Corolla-lobes of ♀ flowers glabrous or glandular. Invol.-bracts slender, almost glabrous, the outer very much smaller than the inner, linear-lanceolate, acute, spreading, the inner bracts linear, subacute, pubescent at the tips. Anthers all fertile. Receptacle glabrous. Pappus shorter than the inner bracts. Achenes about $\frac{1}{30}$ in. long, oblong, hairy, ribbed. Fl. B. I. v. 3, p. 264; C. B. Clarke, Comp. Ind. p. 79 (*partly*); Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. —Flowers: Dec.–Jan.

Konkan: *Law*!, *Woodrow*. S. M. Country: Belgaum, *Ritchie*, $\frac{402}{3}$! Kanara: *Thomson*!—Distrib. India (Assam, Birma, W. Peninsula).

7. **Blumea membranacea,** *DC. Prodr.* v. 5 (1836) p. 440. Annual; stems 2–4 ft. high, stout, striate, more or less glandular-pubescent. Leaves thinly membranous, the lower petioled, sometimes reaching 5½ by 1¾ in. (including the somewhat obscure petiole), obovate, or often lyrate or runcinate, acute- or obtuse, coarsely and deeply serrate, finely pubescent on both sides, base running down like a wing into the petiole. Heads numerous, small, about ¼ in. in diam., on slender glandular-hairy peduncles, in much-branched open panicles. Invol.-bracts glandular-pubescent, the outer much the shorter, lanceolate, spreading, the inner linear, acute. Pappus white. Achenes ribbed.

Scarcely separable from *B. virens*, of which it seems to be a pubescent and glandular form. Fl. B. I. v. 3, p. 265; Trim. Fl. Ceyl. v. 3, p. 22; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: May. Vern. *Mharbir*.

Konkan: *Woodrow*. Deccan: Khandala, *Cooke*!, *Woodrow*!; Poona, *Woodrow*! S. M. Country: Dharwar, *Woodrow*!—Distrib. Throughout India; Ceylon, Malay Islands.

Var. *muralis*, Hook. f. Fl. B. I. v. 3, p. 265. Glandular-hairy. Leaves very tender, elliptic, ovate or lanceolate, the lower often lyrate or pinnatifid, toothed or serrulate, very membranous. Invol.-bracts rigid, pink-colored. *B. muralis* (sp.), DC. Prodr. v. 5, p. 440; Dalz. & Gibs. p. 125.

Common on old walls, *Dalzell & Gibson*. Konkan: *Stocks*!, *Law*!; Bassein Fort, *Dalzell & Gibson*. Kanara: Kála naddi, *Ritchie*, 395!

8. **Blumea oxyodonta,** *DC. in Wight, Contrib.* (1834) p. 15. Herbaceous, prostrate or decumbent, branched from the base; branches slender, leafy, 3–10 in. long, simple or dichotomously forked, pubescent or glabrous, the young ones often sericeo-canescent. Leaves membranous, spinous-toothed, those near the base of the stem reaching sometimes 4–5 by 1½–2½ in., obovate-oblong or elliptic-oblong, petioled, upper stem-leaves much smaller, ½–1½ by ¼–⅞ in., subsessile, obovate or elliptic, pubescent on both sides, the young ones often sericeo-villous.

Heads ¼ in. in diam., solitary or corymbose, on slender peduncles; flowers yellow. Corolla-lobes of ♀ flowers glabrous. Involucral-bracts linear, acute, more or less densely pubescent. Receptacle glabrous. Achenes slightly hairy. Fl. B. I. v. 3, p. 266; C. B. Clarke, Comp. Ind. p. 85; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: Jan.–Mar.

Mr. C. B. Clarke (*l. c.*) says that all the tailless anther-cells he has examined were destitute of pollen, and that Kurz suspected the species *oxyodonta* to be a hybrid or a polygamous form of some other species.

KONKAN: *Law*!, *Ritchie*, 399!; near Ratnagiri, *Kanitkar*!; Vingorla, *Kanitkar*! DECCAN: Lanoli, *Woodrow*. S. M. COUNTRY: Rámghát, *Ritchie*, 401! KANARA: *Thomson*!—DISTRIB. Throughout India; China, Philippines.

9. **Blumea eriantha,** *DC. in Wight, Contrib.* (1834) p. 15. Herbaceous; stem erect, terete, slender, 12–18 in. high, more or less pubescent, dichotomously branched. Leaves 1–3 by ½–1½ in., irregularly apiculately toothed, the teeth sometimes alternately long and short especially in the upper leaves, the lower leaves petioled, obovate, subobtuse, the upper sessile or nearly so, elliptic-oblong, acute, all pubescent or sometimes silky-villous. Heads ¼–⅓ in. in diam., on the long slender silky-hairy peduncles of dichotomous cymes. Corolla-lobes of ♀ flowers hairy. Receptacle glabrous. Involucral-bracts linear, clothed with long silky hairs. Achenes minute, angled, with a few hairs on the angles. Fl. B. I. v. 3, p. 266; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648; Watt, Dict. Econ. Prod. v. 1, p. 458.—Flowers: Dec.–Feb. VERN. *Nimurdi.*

KONKAN: *Law*!; Panvel, *Kanitkar*!; Uran Island, *Kanitkar*! DECCAN: Khandala, *Cooke*!; between Nasik and Igatpuri, *Edgeworth*!; Lanoli, *Cooke*!; Poona, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 400!—DISTRIB. India (W. Peninsula, Banda).

10. **Blumea Belangeriana,** *DC. Prod.* v. 5 (1836) p. 444. Herbaceous; stem erect, terete, much branched from and sparingly hispid at the base, softly villous at the apex, the stem and branches usually red-brown. Lower leaves 2–3 by 1–1¾ in., obovate, attenuated into a short petiole, the upper leaves subsessile, elliptic-oblong, all closely dentate, sparsely hairy above, densely sericeo-villous beneath. Heads ⅓ in. in diam., axillary, sessile, solitary or clustered. Corolla-lobes of ♀ flowers hairy. Receptacle glabrous. Involucral-bracts linear, woolly. Achenes terete, nearly glabrous. Fl. B. I. v. 3, p. 266.—Flowers: Dec.–Mar.

KONKAN: *Stocks*!, *Law*!; S. Konkan and Ghâts, *Ritchie*, 398!; Matheran, *Cooke*!; Vingorla, *Kanitkar*! KANARA: *Law*!; Sirsi (N. Kanara), *Hohenhacker*, 777!—DISTRIB. Apparently endemic in the Konkans and Malabar.

11. **Blumea Malcolmii,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 266. A rather stout plant, densely clothed with soft white silky wool; stem leafy, usually ascending, but sometimes decumbent and branched from the root as in *B. oxyodonta*. Leaves 1–5 by ½–2½ in., sessile, rather thick, obovate, obtuse, acutely and closely irregularly toothed (the margins of the larger leaves sometimes crenate, the crenatures closely set with small spinous teeth), densely clothed with white silky wool, base tapering. Heads ½–¾ in. in diam., in leafy panicles at the ends of the

stem or branches, all woolly with long white silky hairs. Corollas yellow; lobes hairy. Involucral-bracts linear, acute, densely clothed with long white silky hairs, the outer bracts smaller. Achenes obscurely angled, silky. The buds at the crown of the root form globose woolly bodies often clustered together. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *Blumea lanuginosa*, Law, MS. in Herb. Kew. *Pluchea Malcolmii*, C. B. Clarke, Comp. Ind. p. 95.—Flowers: Nov.–Feb.

Konkan: *Lambert*!; hills of the North and South Konkan, *Law*!; Matheran, *Cooke*! Deccan: Khandala, *Cooke*!; Mahableshwar, *Cooke*! S. M. Country: Yellur on the Fort walls, *Ritchie*, 400!

This would seem to have been the plant sent for identification to Sir G. Watt by Dr. Dymock, and noted by the former in Dict. Econ. Prod. v. 1, p. 458, under *B. eriantha*.—Distrib. Apparently endemic in the Bombay Presidency.

12. **Blumea malabarica,** *Hook. f. Fl. B. I.* v. 3, p. 267. More or less pubescent, 3 ft. high (*Ritchie*); stem and branches terete, grooved. Leaves membranous, fragrant when bruised, subsessile, $1\frac{1}{2}$–$5\frac{1}{2}$ by $\frac{3}{8}$–1 in., lanceolate-oblong, acute, distantly serrate, more or less pubescent on both surfaces though often nearly glabrous above, base acute; petioles short, distinct, not merely formed of the narrowed bases of the leaves. Heads pubescent, $\frac{1}{2}$ in. in diam., in small axillary sessile or peduncled clusters. Receptacle broad, pubescent. Involucral-bracts linear, acute, pubescent, the outer much shorter than the inner. Achenes $\frac{1}{20}$–$\frac{1}{16}$ in. long, ribbed, with a few scattered hairs, chiefly towards the apex. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: Feb.

Dalzell without locality in Herb. Kew.! Konkan: *Stocks*! Kanara: *Law*!, *Stocks*!; Sirsi, *Woodrow*; Uskeli, *Ritchie*, 1817!—Distrib. India (W. Peninsula).

13. **Blumea spectabilis,** *DC. Prodr.* v. 5 (1836) p. 445. Shrubby, 4–6 ft. high; stem stout, glabrous or puberulous. Leaves 6–10 by $1\frac{3}{4}$–$2\frac{1}{2}$ in., lanceolate or oblanceolate, acute, shallowly serrate, glabrous on both sides, much tapered at the base into a long winged petiole which is often furnished with 2–3 small divaricate appendages. Heads $\frac{1}{4}$–$\frac{1}{2}$ in. in diam., on pubescent peduncles, very numerous, forming a large elongated pyramidal lax panicle with narrow leafy bracts beneath the branches; flowers yellow. Corolla-lobes of ♀ flowers glandular. Involucral-bracts slender, pubescent, the outer rows short and slightly spreading. Pappus at first tawny, ultimately red. Achenes silky, scarcely ribbed. Fl. B. I. v. 3, p. 269; Trim. Fl. Ceyl. v. 3, p. 22. *Blumea myriocephala*, Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648 (*not* of DC.). *B. Wallichii*, C. B. Clarke, Comp. Ind. p. 87. *B. longifolia*, DC. Prodr. v. 5, p. 446; Dalz. & Gibs. p. 125.—Flowers: Feb.

Konkan: *Stocks*!, *Dalzell*! Kanara: Pardana, *Ritchie*, 1818!; Divimana, *Woodrow*; Ghâts of N. Kanara, *Talbot*, 250!—Distrib. India (W. Peninsula); Ceylon.

Blumea laciniata, DC. Prodr. v. 5 (1836) p. 436, which differs from *B. lacera* chiefly in having a pubescent receptacle, is given in Fl. B. I. v. 3, p. 264, as occurring (though rarely) in the Konkan. I cannot find any authentic specimens of the plant from that region. Dalzell has 2 specimens in his Herbarium which was presented to Kew, but no locality has been assigned to them. Dalzell does not include the plant in his 'Bombay Flora,' nor has Woodrow got it in his list.

14. **LAGGERA,** Sch.-Bip.

Annual or perennial herbs. Leaves alternate, often rigid and decurrent. Heads paniculate, or subsessile in the uppermost axils, heterogamous, disciform, the outer flowers ♀, fertile, ∞-seriate, those of the disk ☿, fertile; corollas of the ♀ flowers filiform, shorter than their styles, minutely toothed, those of the ☿ flowers regular, tubular, the limb slightly enlarged, shortly 5-fid. Involucre campanulate; bracts ∞-seriate, imbricate, narrow, often rigid, the outer the shorter. Receptacle flat, naked. Anther-bases shortly 2-lobed or sagittate, not tailed. Style-arms of ☿ flowers linear-subulate, papillose. Pappus-hairs slender, 1-seriate, free, or very shortly connate at the base. Achenes small, glabrous, or sparingly pilose.—DISTRIB. Tropical Africa and India; species 2.

Stem winged ..... 1. *L. alata.*
Stem not winged ..... 2. *L. aurita.*

1. **Laggera alata,** *Schultz-Bip. ex Oliver, in Trans. Linn. Soc.* v. 29 (1875) p. 94. Herbaceous; stem erect, branched, winged, clothed with fuscous or rufous (often glandular) pubescence. Leaves sessile, decurrent so as to form the quite entire wings on the stem, 1–4 by ⅜–1¼ in., narrowly oblong, obtuse or subacute, toothed or rarely entire, pubescent or subvillous on both sides. Heads 1 or few, ⅜–⅝ in. in diam.; peduncles axillary, solitary, often drooping, bracteate; flowers purple. Involucre campanulate; bracts many-seriate, the outer lanceolate, acute, much shorter than the inner, pubescent outside, the innermost scarious, subglabrous, linear, acuminate. Anthers ecaudate. Pappus white. Achenes cylindric, slightly ribbed, appressedly pilose. Fl. B. I. v. 3, p. 271; C. B. Clarke, Comp. Ind. p. 91; Trim. Fl. Ceyl. v. 3, p. 23. *Blumea alata,* DC. Prodr. v. 5, p. 448; Grah. Cat. p. 97; Dalz. & Gibs. p. 125; Wight, Icon. t. 1101.—Flowers: Nov.–Jan.

KONKAN: *Law!, Dalzell!*; on the Ghâts, *Dalzell & Gibson.* S. M. COUNTRY: Belgaum (east hills), *Ritchie,* 1820! KANARA: Kâla naddi, *Ritchie,* 1820!—DISTRIB. India (Tropical Himalayas, hills of the W. Peninsula); Ceylon, Java, China, Philippines, Tropical Africa.

2. **Laggera aurita,** *Schultz-Bip. in Schweinf. Beitr. Flor. Aethiop.* (1867) p. 151. A perennial herb 1–3 ft. high; stem erect, slender, cylindric, with many ascending branches, viscous-hairy, not winged. Leaves numerous, sessile or petiolate, membranous, shortly decurrent, obovate or oblanceolate, toothed, lobed or ½–pinnatifid, the lower 2–4 in. long, the upper much smaller often bract-like on the branches, all viscous-hairy on both sides. Heads peduncled, ⅓–½ in. in diam., in corymbose or diffuse terminal panicles; flowers pink. Invol.-bracts linear, very acute, the outer very short, silky-hairy, herbaceous, the inner much longer, scarious. Pappus white. Achenes thinly hairy, obscurely ribbed. Fl. B. I. v. 3, p. 271; C. B. Clarke, Comp. Ind. p. 92; Trim. Fl. Ceyl. v. 3, p. 24; Watt, Dict. Econ. Prod. v. 4, p. 584. *Blumea aurita,* DC. Prod. v. 5, p. 449; Grah. Cat. p. 97; *Aitch. Pb. & Sind* Pl. p. 74.—Flowers: Dec.–Feb.

KONKAN: *Law!* SIND: *Stocks!*

15. **PLUCHEA,** Cass.

Shrubs or undershrubs (rarely herbs) tomentose or glutinous. Leaves alternate. Heads small, in terminal leafless corymbs, or large and subsolitary, heterogamous, disciform, white, yellow or lilac; outer flowers ♀, fertile, ∞-seriate; disk-flowers ☿, few, sterile. Involucre ovoid or broadly campanulate; bracts ovate or lanceolate, usually broad, dry, rigid. Receptacle flat, naked. Corollas of ♀ flowers filiform, shorter than their styles, 3-fid or minutely toothed at the apex, those of ☿ flowers regular, tubular, with a slightly enlarged limb, 5-fid at the apex. Style-arms of ☿ flowers filiform, entire or 2-fid. Anther-bases sagittate, the cells tailed. Pappus-hairs slender, 1-seriate, free, or in the sterile achenes very many, more or less connate at the base.—DISTRIB. Tropical and subtropical countries; species about 30.

Heads in compound corymbs.
Outer invol.-bracts ovate, acute.
Leaves acutely serrate-dentate ..... 1. *P. tomentosa.*
Leaves entire or nearly so ..... 2. *P. Wallichiana.*
Outer invol.-bracts oblong, rounded, very obtuse..... 3. *P. lanceolata.*
Heads subsolitary.
Outer invol.-bracts very small, lanceolate-subulate ..... 4. *P. arguta.*

1. **Pluchea tomentosa,** *DC. in Wight, Contrib.* (1834) p. 16. A shrub 4–10 ft. high; stems and branches terete, not winged, striate, more or less pubescent below, glandular-pubescent in the upper parts. Leaves sessile, sub-amplexicaul, often auricled at the base, 1–3 by $\frac{5}{8}$–$1\frac{3}{8}$ in., broadly obovate, obtuse or subacute, acutely serrate-dentate, more or less pilose above, softly pubescent beneath. Flowers in compound many-headed corymbs which are terminal or from the upper axils. Involucre campanulate; outer bracts short, ovate, acute, slightly pubescent; the innermost linear-oblong, acute, ciliate near the apex. Receptacle glabrous. Pappus minutely barbellate. Achenes obscurely angled.

Ritchie gives 4 ft. as the height of the shrub, while Dalzell in a note attached to a specimen in Herb. Kew. gives it as 10 ft. Fl. B. I. v. 3, p. 272; C. B. Clarke, Comp. Ind. p. 94; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: Dec.–Feb.

KONKAN: N. & S. Konkan, *Law*!; Thal Ghát, *Edgeworth*! DECCAN: Bijapur, *Woodrow*; Chákan, *Dalzell*! S. M. COUNTRY: Fort ditch, Belgaum, *Ritchie*, 1822! KANARA: *Law*!; Haliyal, *Ritchie*, 1822! SIND: *Stocks*!—DISTRIB. India (Bengal, Central India, W. Peninsula).

2. **Pluchea Wallichiana,** *DC. Prodr.* v. 5 (1836) p. 451. A tall shrub; stem and branches not winged, terete, striate, the upper portions viscous-pubescent. Leaves sessile, 1–$2\frac{3}{4}$ by $\frac{3}{8}$–$1\frac{1}{8}$ in., rigid, elliptic-oblong or obovate, obtuse or subacute, often apiculate, usually entire, or sometimes faintly toothed, pubescent on both surfaces; nerves prominent. Heads numerous, $\frac{1}{2}$–$\frac{3}{4}$ in. in diam., in compound corymbs; pedicels glandular-hairy. Involucre campanulate; outer bracts short, ovate-oblong, acute, pubescent; the innermost bracts linear, acute, pubescent at the apex. Achenes obscurely angled, the angles silvery-white, scarcely pilose. Fl. B. I. v. 3, p. 272; Dalz. & Gibs. p. 126; C. B. Clarke, Comp. Ind. p. 94. *P. Wallichii*, Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: Feb.

GUJARAT: Dhej, *Dalzell*, 52!; Dangs, *Woodrow*. SIND: *Vicary*!; Sind hills, *Dalzell*!—DISTRIB. India (Panjáb); Beluchistan.

3. **Pluchea lanceolata,** *C. B. Clarke, Comp. Ind.* (1876) p. 94. An erect undershrub; stem and branches terete, slender, softly ashy-pubescent. Leaves sessile, very coriaceous, 1–2¼ by ¼–½ in., oblong or oblanceolate, obtuse, apiculate, narrowed at the base, finely ashy-pubescent on both sides, entire; main nerves prominent. Heads in compound corymbs. Involucre contracted at the mouth; outer bracts 2–3-seriate, oblong, very obtuse, pubescent, usually tinged with purple; the innermost bracts linear, subacute, few. Pappus-hairs distinctly connate at the base. Fl. B. I. v. 3, p. 272; Oliver & Hiern, Fl. Trop. Afr. v. 3 (1877) p. 329; Watt, Dict. Econ. Prod. v. 6, part 1, p. 291. *Berthelotia lanceolata*, DC. Prodr. v. 5, p. 376; Aitch. Pb. & Sind Pl. p. 73.—Flowers: Dec.

SIND: *Vicary* ex *Aitchison*, *Dalzell*, 43!, *Stocks*, 451!; Ruk Junction near the Railway Station, *Cooke*!—DISTRIB. India (Panjáb, Gangetic plain as far as Cawnpore); Afghanistan, N. Africa.

4. **Pluchea arguta,** *Boiss. Diag.* ser. ii. fasc. 3 (1856) p. 5. A stout branched shrub, thick soft and fleshy when near the sea, shrubby and with thin leaves when inland (*Dalzell*, MS. in Herb. Kew.), the upper parts glandular-pubescent. Leaves sessile, 1–2 in. long, varying much in breadth (from ⅙–⅞ in.), obovate-oblong or oblanceolate, sometimes inciso-pinnatifid, glandular-pubescent, acutely serrate or dentate, narrowed at the base. Heads peduncled, subsolitary, ⅓–½ in. in diam. Invol.-bracts rigid, ∞-seriate, the outer very small, narrowly lanceolate-subulate, pubescent and ciliate, those of the intermediate rows similar but longer, the innermost elongate, linear, acute, pubescent and ciliate at the tip. Receptacle naked. Pappus-hairs slender, shortly barbellate. Achenes with a few appressed hairs, cylindric, slightly ribbed. Fl. B. I. v. 3, p. 273; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *Pluchea frutescens*, Benth. in Hook. Icon. Pl. v. 12, t. 1157. *Laggera arida*, C. B. Clarke, Comp. Ind. p. 92.—Flowers: Jan.–Feb.

In the Bombay Presidency confined to Sind. SIND: *Dalzell*, 8!, *Stocks*, 553!; Boogta hills, *Vicary*!; Mulir district, *Bhola Puran*!; Karachi, *Vicary*!—DISTRIB. India (Panjáb); Beluchistan.

16. NANOTHAMNUS, T. Thoms.

A rigid woolly often decumbent herb. Leaves alternate, acutely serrate-dentate. Heads small, subsessile, subterminal and axillary, heterogamous, disciform; outer flowers 1–4 (rarely 0) ♀, fertile; disk flowers ☿, few, fertile. Involucre ovoid; bracts ∞-seriate, imbricate, lanceolate, dry, the interior subscarious, the exterior gradually shorter, hispid on the back. Receptacle flat, naked. Corollas of the ♀ flowers filiform, 2-3-toothed, those of the ☿ flowers with a slender tube, the limb campanulate, sub-2-lipped, the outer lip 4-lobed, the inner free to the base of the limb. Anther-bases sagittate, the auricles mucronate or shortly tailed. Style-arms of ☿ flowers filiform. Pappus 0 or a minutely 5-toothed crown. Achenes obovoid, with 5–8 slender ribs, the tip rounded.—DISTRIB. Apparently endemic in the Bombay Presidency; species 1.

1. **Nanothamnus sericeus,** *Thoms. in Journ. Linn. Soc.* v. 9 (1867) p. 342, t. 3. A prostrate or suberect and ascending herb; branches many from the root, 6–12 in. long, pubescent. Leaves 1–3½ by ¼–¾ in. (the uppermost cauline leaves often smaller), subsessile, the lower leaves usually oblanceolate, the upper lanceolate, all acutely and irregularly toothed, densely woolly on both sides, strongly nerved. Heads ¼ in. in diam., in dense clusters.

The buds at the crown of the root often form globose woolly bodies as in *Blumea Malcolmii*. In habit and general appearance the plant bears some resemblance to *Blumea oxyodonta*. Fl. B. I. v. 3, p. 273; C. B. Clarke, Comp. Ind. p. 96; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: Feb.–Apr.

KONKAN: on the hills, *Dalzell*!, *Law*! DECCAN, Lanoli, *Woodrow*; Igatpuri, *Kanitkar*!, *Cooke*!—DISTRIB. Apparently endemic.

17. EPALTES, Cass.

Erect or diffuse herbs. Leaves alternate, usually decurrent. Heads small, solitary or corymbose, heterogamous, disciform; outer flowers ∞-seriate, ♀, fertile; disk-flowers few, ☿, usually sterile. Involucre ovoid, campanulate or hemispheric; bracts ∞-seriate, imbricate, dry, rigid, usually broad. Receptacle flat, convex or raised, naked. Corollas of ♀ flowers shorter than their styles, filiform, 2–3-toothed, those of the ☿ flowers regular, tubular, with a 3–5-fid limb. Anther-bases sagittate, the auricles small, connate, minutely caudate-acuminate. Style of ☿ flowers subulate, entire or 2-fid. Achenes of ♀ flowers subterete, 5–10-ribbed, without pappus, the achenes of ☿ flowers usually abortive, with a pappus of 2–3 hairs caducous, or 0.—DISTRIB. Tropical Asia, Africa, America, and Australia; species about 9.

1. **Epaltes divaricata,** *Cass. in Bull. Soc. Philom.* (1818) p. 139. A small nearly glabrous annual, 3–8 in. high; main stem usually short, erect, with numerous long divaricate straggling winged branches. Leaves sessile, ¾–2¼ by ⅛–¼ in., linear-oblong, obtuse, glabrous, entire or distantly toothed, narrowed at the base, decurrent. Heads solitary, ¼–⅓ in. in diam., terminating short winged branchlets (peduncles?); flowers purple. Invol.-bracts lanceolate, rigid, sharply acuminate, the outer short, somewhat spreading. The ☿ disk-flowers barren. Pappus 0. Achenes scarcely $\frac{1}{30}$ in. long, pale, obovoid-oblong. Fl. B. I. v. 3, p. 274; Dalz. & Gibs. p. 126; C. B. Clarke, Comp. Ind. p. 96 (exclud. syn. *E. pygmæa*); Trim. Fl. Ceyl. v. 3, p. 24; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: Oct.–Jan.

A common weed in damp places. KONKAN: *Law*!; S. Konkan, *Ritchie*, $\frac{411}{1}$!; Malwán, *Woodrow*; Mazgaon, near Savantvadi in rice-fields, *Cooke*!; Sanganeshvar, *Kanitkar*! S. M. COUNTRY: Gunji, S. of Belgaum, *Ritchie*, $\frac{411}{2}$! KANARA: *Thomson*!; Kála naddi, *Ritchie*, 411!—DISTRIB. India (Birma, W. Peninsula); Ceylon, Java, China.

18. SPHÆRANTHUS, Linn.

Divaricately-branched herbs. Leaves alternate, toothed, decurrent along the stem. Heads small, very numerous, sessile, crowded on a large common receptacle into more or less globose terminal compound

heads with or without a general involucre of empty bracts at base; outer flowers, ♀, few or many, fertile; disk-flowers ☿, solitary or few, fertile or sterile. Involucre narrow; bracts few or many, acute, subpaleaceous, slightly unequal. Receptacle small, naked. Corollas of ♀ flowers slender, tubular, minutely 2–3-toothed, those of the ☿ flowers regular, the tube thickened, the limb 4–5-toothed. Anther-bases sagittate; auricles acute or tailed. Style-arms of ☿ flowers filiform or connate. Pappus 0. Achenes oblong, compressed.—DISTRIB. Tropics; species 8.

Wings of stem toothed; invol.-bracts linear, acuminate, pubescent at the apex	1. *S. indicus.*
Wings of stem entire; invol.-bracts obovate-spathulate, rounded and glabrous at the apex	2. *S. africanus.*

1. **Sphæranthus indicus,** *Linn. Sp. Pl.* (1753) p. 927. A much-branched herb about 1 ft. high; stem and branches cylindric, with toothed wings, more or less glandular-hairy. Leaves sessile, decurrent, $\frac{3}{8}$–2 by $\frac{3}{16}$–$\frac{7}{8}$ in., obovate-oblong, rounded or subacute, glandular-hairy, spinous-serrate or dentate, narrowed at the base. Heads $\frac{3}{8}$–$\frac{5}{8}$ in. in diam., compound, globose-ovoid, ebracteate, on solitary glandular peduncles with toothed wings; flowers purple. Invol.-bracts linear, acuminate, pubescent and ciliate near the ends. Achenes glabrous, stalked. Fl. B. I. v. 3, p. 275; Trim. Fl. Ceyl. v. 3, p. 26; Watt, Dict. Econ. Prod. v. 6, part 3, p. 320. *Sphæranthus mollis,* Roxb. Hort. Beng. p. 62; Grah. Cat. p. 96; Dalz. & Gibs. p. 123. *S. hirtus,* Willd. Sp. Pl. v. 3, p. 2395; C. B. Clarke, Comp. Ind. p. 97.—Flowers: Nov.–Jan. VERN. *Mundi*; *Gorákh-mundi.*

KONKAN: *Law*!; Kalyan, *Cooke*!; Bassein, *Raoji*!; Vingorla, *Kanitkar*!; Dasgaon, *Kanitkar*! DECCAN: Gogve, west of Kolapur, *Kanitkar*! S. M. COUNTRY: Dharwar, *Cooke*!; Belgaum in rice-fields, *Ritchie*, 410! GUJARAT: *Woodrow*, 12!—DISTRIB. Throughout India; Ceylon, Africa, Malay Islands, Australia.

2. **Sphæranthus africanus,** *Linn. Sp. Pl.* ed. 2, v. 2 (1763) p. 1314. A fragrant plant 8–24 in. high; stem compressed, glabrous, with entire wings; branches numerous, divaricate. Leaves sessile, decurrent, 1½–2½ by ½–1 in., obovate, obtuse, more or less glandular-pubescent, finely toothed, narrowed at the base. Heads ¼–⅓ in. in diam., globose, ebracteate; flowers purple. Invol.-bracts obovate-spathulate, rounded at the apex, glabrous. Fl. B. I. v. 3, p. 275; Trim. Fl. Ceyl. v. 3, p. 26: Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *Sphæranthus microcephalus,* Willd. Sp. Pl. v. 3, p. 2395; C. B. Clarke, Comp. Ind. p. 97.—Flowers: Oct.

KONKAN: *Law*!, *Stocks*!, *Dalzell*; Vingorla, *Woodrow*.—DISTRIB. Throughout India; Ceylon, Persia, Africa, Malay Islands, China, Philippines, Australia.

19. BLEPHARISPERMUM, Wight.

Glabrous shrubs. Leaves alternate. Heads small, compressed, in solitary or crowded globose clusters which are sessile on an oblong or cylindric common receptacle, heterogamous, discoid; outer flowers ♀, few, fertile; disk-flowers ☿, 2–8, fertile or sterile. Invol.-bracts 1–2, like the paleæ of the receptacle, but shorter. Receptacle minute or cylindric with broad dry or rigidly scarious paleæ enclosing the flowers. Corollas of ♀ flowers filiform, 3–4-toothed, those of the ☿ flowers

regular, tubular, with a slightly enlarged or campanulate 5-fid limb. Anther-bases sagittate; auricles subcaudate. Style-arms of ☿ flowers linear, stout, obtuse. Fertile achenes compressed, black; the outer or both faces with a ciliate rib, the margins ciliate. Pappus, paleæ or bristles unequal or with 2–3 stronger ones at the angles, or 0 in the sterile achenes.—DISTRIB. Species 3, of which 2 are Indian, the third African.

1. **Blepharispermum subsessile,** *DC. in Wight, Contrib.* (1834) p. 12. Shrubby, erect, 3 ft. high; rootstock woody; branches terete, striate, glabrous. Leaves subsessile, 2–5 by 1–2¼ in., ovate or elliptic, obtuse or subacute, coriaceous, entire (rarely toothed), reticulately veined, glabrous. Heads 5–10-flowered, in large terminal globose clusters 1–1½ in. in diam., with broad leafy bracts at the base; ♀ flowers in each head 2, with a few bristles as pappus and compressed obovoid achenes which are almost villous with long hairs; ☿ flowers in each head 3–8, with similar pappus and smaller achenes. Fl. B. I. v. 3, p. 276; Grah. Cat. p. 96; Wight, Icon. t. 1093; C. B. Clarke, Comp. Ind. p. 98; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *Leucoblepharis subsessile,* Arn. in Mag. Zool. & Bot. v. 2 (1838) p. 422; Dalz. & Gibs. p. 123. —Flowers: Aug.–Sept.

DECCAN: Kartriz Ghát near Poona, *Bhiva*! S. M. COUNTRY: common about Dharwar, *Law* ex *Graham*; Dharwar, *Woodrow*; Belgaum, *Stocks*!, *Ritchie*, 415! KANARA: *Law*!, *Stocks*!—DISTRIB. India, W. Peninsula.

Anaphalis cutchica, C. B. Clarke, Comp. Ind. (1876) p. 111, is given by Woodrow in his list as occurring at Barda, Kathiawar. I have not seen any specimens from that locality. Mr. C. B. Clarke, in a recent MS. note to his original description of the species (Comp. Ind. l. c.), expresses a doubt as to the correctness of his identification of the plant as an *Anaphalis*, while a similar doubt is expressed by Sir Joseph Hooker (Fl. B. I. v. 3, p. 284). There is but a single sheet of the species in Herb. Kew., the specimens on which are insufficient to accurately determine the point. They were collected by Dr. Stoliczka in Kutch.

20. LASIOPOGON, Cass.

Small annual much-branched densely woolly herbs. Leaves alternate, small, quite entire. Heads small, in crowded clusters, heterogamous, disciform; outer flowers ♀, fertile, 2–∞-seriate; disk-flowers ☿, few or many, fertile. Involucre campanulate; bracts few-seriate, the inner narrow, scarious, subhyaline, the outer shorter, subherbaceous, woolly on the back. Receptacle small, naked. Corollas of ♀ flowers filiform, minutely dentate, those of ☿ flowers regular, slender, tubular, the limb slightly enlarged, 3-toothed. Anther-bases sagittate, with slender tails. Style-arms of ☿ flowers slender, truncate. Pappus-hairs separately caducous, feathery. Achenes subfusiform.—DISTRIB. Africa and Orient; species 2.

1. **Lasiopogon lanatum,** *Cass. in Dict. Sc. Nat.* v. 25 (1822) p. 302. A small plant 1–2 in. in diam., looking like a cluster of cottony balls on the ground, the leaves and flowers being hidden by the woolly covering; branches many from the root, terete, filiform, prostrate. Leaves $\frac{1}{10}$–$\frac{1}{4}$ in. long, linear-oblong or spathulate, woolly. Heads about $\frac{1}{8}$ in. long, in globose villous clusters subtended by floral leaves.

Involucre-bracts linear, obtuse, scarious. Fl. B. I. v. 3, p. 287; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.

Rare. SIND: Kirthar mountains, *Woodrow*.

21. GNAPHALIUM, Linn.

Hoary or woolly herbs. Leaves alternate, usually quite entire. Heads small, in terminal or axillary corymbs or fascicles, heterogamous, disciform; outer flowers ♀, fertile, 2–∞-seriate; disk-flowers ☿, fewer, fertile. Involucre ovoid or campanulate; bracts ∞-seriate, imbricate, all scarious, or with a white, yellow, or brown, more or less scarious blade. Receptacle naked or pitted. Corollas of ♀ flowers filiform, minutely dentate or shortly 3–4-fid at the apex, those of the ☿ flowers regular, tubular, slender, the limb slightly enlarged, shortly 5-fid. Anther-bases sagittate, finely tailed. Style-arms of ☿ flowers slender, truncate. Achenes oblong or obovate, subterete or slightly compressed. Pappus-hairs 1-seriate, slender or thickened towards the tip, separately caducous or more or less connate at the base into a ring.—DISTRIB. Cosmopolitan; species about 100.

Heads in corymbose leafless clusters	1. *G. luteo-album.*
Heads in leafy spikes	2. *G. indicum.*
Heads in rounded leafy axillary or terminal clusters	3. *G. pulvinatum.*

1. **Gnaphalium luteo-album,** *Linn. Sp. Pl. (1753)* p. 851. Herbaceous, 6–18 in high, sometimes woody at the base, erect, ascending or decumbent; stem simple or branched and as well as the branches softly woolly. Leaves sessile, 1–2½ by ⅛–½ in., spathulate-oblong or linear-oblong, usually obtuse, sometimes mucronate, the upper ½-amplexicaul, smaller than the lower, all woolly on both surfaces, especially the lower one (the upper surface sometimes glabrate), entire or very rarely obscurely toothed. Flowers in dense leafless corymbose clusters of yellow glistening heads. Invol.-bracts shining, straw-colored, the outer ovate, subobtuse, the innermost linear, acute or subobtuse, all with a subherbaceous nucleus near the base, thinly scarious and transparent in the upper part. Pappus shorter than the involucre. Achenes oblong, papillose. Fl. B. I. v. 3, p. 288; C. B. Clarke, Comp. Ind. p. 114; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648; Watt, Dict. Econ. Prod. v. 3, p. 517.—Flowers: Mar.

KONKAN: Matheran, *Woodrow*! DECCAN: Dehu (Poona districts), *Woodrow*!; Wadgaon, *Woodrow*! SIND: *Cooke*!—DISTRIB. Throughout India; most hot and warm temperate countries.

2. **Gnaphalium indicum,** *Linn. Sp. Pl. (1753)* p. 852. Herbaceous, 4–12 in. high; stem usually much-branched from near the base, erect or decumbent, more or less white-woolly. Leaves ½–1½ by ⅛–⅝ in., narrowly linear-obovate or spathulate, obtuse, apiculate, the upper leaves sessile, the lower usually shortly petioled, woolly, especially on the margins and beneath, sometimes glabrate above, particularly when grown in shady places. Heads small, ⅛ in. in diam., sessile, in small dense terminal and subterminal spiciform clusters. Invol.-bracts usually straw-colored, linear-oblong, subacute, the outer woolly, the inner nearly glabrous. Achenes oblong, slightly papillose. Fl. B. I. v. 3, p. 289; Grah. Cat. p. 97; Dalz. & Gibs. p. 130; C. B. Clarke, Comp. Ind. p. 114.—Flowers: Dec.–Mar.

KONKAN: *Law*!, *Lambert*!; Pen, *Woodrow*; Matheran, *Cooke*! DECCAN: *Woodrow*! S. M. COUNTRY: Belgaum hill (north), *Ritchie*, 408! SIND: near the Manchar lake, *Kanitkar*!; Hyderabad, *Cooke*!—DISTRIB. Throughout India and Birma; Africa, China, Japan, Australia.

3. **Gnaphalium pulvinatum,** *Delile, Descript. de l'Egypte* (1812) p. 266, t. 44. A small prostrate woolly herb; stems 1–6 in. long, numerous, spreading from the root. Leaves $\frac{1}{4}$–$\frac{2}{3}$ by $\frac{1}{12}$–$\frac{1}{8}$ in., spathulate, more or less obtuse, mucronate, woolly, attenuated at the base into a short petiole. Heads $\frac{1}{12}$–$\frac{1}{8}$ in. in diam., immersed in white wool, crowded in subglobose leafy or involucrate terminal clusters about $\frac{1}{2}$ in. in diam. Involucre-bracts linear-lanceolate, acute, scarious. Achenes oblong, minutely papillose. Fl. B. I. v. 3, p. 289; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *Gnaphalium crispatulum*, C. B. Clarke, Comp. Ind. p. 115 (*not* of Delile).—Flowers: Jan.–Feb.

DECCAN: Sinhagad hill near Poona, *Woodrow*; Máwal taluka (Poona districts), in rice-fields, *Kanitkar*! SIND: *Stocks*!—DISTRIB. Sparingly throughout the plains of India; Egypt.

22. **INULA,** Linn.

Herbs, rarely shrubs. Leaves radical and alternate. Heads at the ends of the branches, solitary, corymbose, or panicled, heterogamous, rayed (rarely disciform); ray-flowers ♀, fertile, 1–∞-seriate; disk-flowers ☿, tubular. Involucre hemispheric or campanulate (rarely ovoid); bracts ∞-seriate, imbricate, the inner usually rigid and narrow, the outer herbaceous, the outermost often foliaceous. Receptacle flat or tumid, pitted or areolate. Corollas of ♀ flowers ligulate, the ligules long, short, or minute, yellow or white, 3-toothed; corollas of the ☿ flowers regular, tubular, yellow, the limb elongate, slightly enlarged, 5-toothed. Anther-bases sagittate, with rather small auricles; tails long, simple or branched. Style-arms of ☿ flowers linear, slightly flattened, broader upwards, obtuse. Achenes subterete, ribbed. Pappus-hairs few or many, 1–2-seriate, rather short, smooth, scabrid or bearded. —DISTRIB. Europe, Asia, and Africa; species about 56.

1. **Inula grantioides,** *Boiss. Diag.* ser. ii. fasc. 3 (1856) p. 14. Shrubby, perennial, 6–24 in. high, glandular-hairy, much branched; stem stout, woody; branches leafy. Leaves 1–2 in. long, variably lobed, the lower leaves petioled, cuneate, shortly 3-lobed, the upper sessile, linear, entire or 2–3-toothed at the apex, all fleshy, glandular and hairy. Heads numerous, $\frac{3}{4}$–$1\frac{1}{4}$ in. in diam., solitary, often furnished with 1 or 2 leafy bracts; peduncles stout, hairy. Involucre-bracts narrowly linear-oblong, subacute, hairy and glandular, the outer the smaller. Ray-flowers ligulate, few, yellow, 1-seriate. Disk-flowers tubular, acutely toothed. Pappus rigid, scabrid, much longer than the achenes, yellowish at first, then reddish. Achenes $\frac{1}{10}$–$\frac{1}{8}$ in. long, oblong, strongly ribbed, hispid. Fl. B. I. v. 3, p. 296; Boiss. Fl. Orient. v. 3, p. 195; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648. *Inula cutchica*, C. B. Clarke, Comp. Ind. p. 126. *Callistephus cuneatus*, Dalz. MS. in Herb. Kew.—Flowers: Nov.–Dec.

SIND: *Stocks*, 519!, *Woodrow*; common on rocks, *Dalzell*!; Karachi, *Dalzell*!; Moach near Karachi, *Cooke*!; Hyderabad, *Cooke*!; Garral (Lower Sind), *Stocks*, 437!—DISTRIB. Kutch, Beluchistan, Wazaristan, S.E. Arabia.

23. VICOA, Cass.

Annual or perennial herbs. Leaves alternate, entire or toothed. Heads solitary, terminal or on leaf-opposed peduncles, heterogamous, rayed. Ray-flowers ♀, fertile, 1–2-seriate, 2–3-toothed; disk-flowers ☿, fertile, slender, the limb hardly dilated, 5-toothed. Involucre campanulate; bracts many-seriate, narrow, with scarious margins, the outer shorter. Receptacle flat or subconvex, naked. Anther-bases sagittate; tails slender. Style-arms of ☿ flowers flattened, broader upwards, obtuse or truncate. Achenes small, hardly ribbed, tip rounded. Pappus-hairs of ray-flowers few or 0, of disk-flowers few or many.—DISTRIB. Tropical and Western Asia and Africa; species 6.

Leaves sessile; invol.-bracts erect; ray-flowers epappose ..... 1. *V. auriculata.*
Leaves petioled; invol.-bracts squarrose; ray-flowers pappose . 2. *V. cernua.*

1. **Vicoa auriculata,** *Cass. in Ann. Sc. Nat.* sér. 1, v. 17 (1829) p. 418. A slender, erect, rigid, leafy herb 1–3 ft. high; stems terete, striate, glabrous or pubescent; branches often numerous in the upper part, ascending, terete, more or less pubescent. Leaves very variable in size, sessile, usually 1–3 by $\frac{1}{8}$–$\frac{1}{2}$ in. (sometimes much larger, reaching 6–7 in. long), oblong-lanceolate, acute, entire or serrulate, rough or scabrid with short appressed hairs on both sides, pale beneath, dilated and with rounded auricles at the base. Heads $\frac{1}{4}$–$\frac{3}{4}$ in. in diam., on long slender peduncles. Invol.-bracts slender, erect, linear, acute, more or less hairy and with membranous margins, the outer much the shorter. Ray-flowers 12–24, much longer than the involucre; ligules yellow, narrow, 3-toothed at the apex, revolute. Pappus of ray-flowers 0, of disk-flowers scanty. Achenes $\frac{1}{30}$–$\frac{1}{25}$ in. long, pale, terete, sparsely hairy. Fl. B. I. v. 3, p. 297; Trim. Fl. Ceyl. v. 3, p. 33; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649. *Vicoa indica*, DC. in Wight, Contrib. p. 10; Grah. Cat. p. 97; Dalz. & Gibs. p. 126; Wight, Icon. t. 1148; C. B. Clarke, Comp. Ind. p. 127. *Vicoa appendiculata*, DC. Prodr. v. 5, p. 474; C. B. Clarke, Comp. Ind. p. 127. *Doronicum calcaratum*, Roxb. Hort. Beng. p. 61; Fl. Ind. v. 3, p. 434.—Flowers: Nov.-Feb. VERN. *Sonkadi.*

I have examined many of the ligulate flowers of the species, including some from Wight's type-specimens, and have always found them destitute of pappus. Wight in his figure (Icon. t. 1148) shews several pappus-hairs on the achenes of the female flowers, but Roxburgh, Fl. Ind. l. c., says that the female florets have no pappus, while Dalzell & Gibson give as a distinguishing character of the next species the presence of a few pappus-hairs, thus implying their absence in this species.

KONKAN: *Lambert!*, *Law!* DECCAN: *Woodrow*; Poona, *Cooke!*; Kamatki Ghát, *Cooke!*; Alandi, *Bhiva!*; Kartriz, *Kanitkar!*; Dongergaon near Ahmednagar, *Cooke!* S. M. COUNTRY: Belgaum, *Ritchie*, 403!; Hubli, *Hohenhacker*, 764!—DISTRIB. Throughout the drier parts of India; Ceylon.

2. **Vicoa cernua,** *Dalz. & Gibs. Bo. Fl.* (1861) p. 126 & p. 314. Annual, slender, 10–20 in. high; stem terete, striate, more or less pubescent, often with many filiform branches in the upper part. Leaves 2–3 by $\frac{3}{4}$–1 in., petioled, elliptic-lanceolate, acute or acuminate, crenate-serrate (rarely entire), sparsely clothed on both sides (especially the upper) with short appressed hairs, base acute, not auricled; petioles

short. Heads ½–¾ in. in diam., drooping; peduncles filiform, often with a small foliaceous bract above the middle. Involucre-bracts very slender, setaceous, with long filiform tips, more or less hairy, the outer squarrose. Ray-flowers 20–40, linear, spreading, yellow, shortly 3-toothed at the apex, longer than the involucre. Pappus of ray-flowers of few bristles. Achenes $\frac{1}{40}$ in. long, oblong, sparsely hairy. Fl. B. I. v. 3, p. 297; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649.—Flowers: Nov.–Feb.

Elevated parts of the Konkan and Deccan. KONKAN: Matheran, *Cooke*!; Amboli Ghát, *Kanitkar*! DECCAN: Mahableshwar, *Cooke*!, *Woodrow*.—DISTRIB. Apparently endemic in the Bombay Presidency.

24. **PULICARIA,** Gærtn.

Annual or perennial usually woolly or villous herbs. Leaves alternate, sessile, often cordate-amplexicaul. Heads yellow, solitary, rayed and heterogamous, or disciform and homogamous; ray-flowers ♀, 1–2-seriate; disk-flowers slender, ☿, fertile. Involucre hemispheric or obconic; bracts few-seriate, subequal or the outer shorter, linear, acute or subobtuse. Receptacle flat or subconvex, pitted. Corollas of ♀ flowers ligulate or tubular, those of the ☿ flowers regular, tubular, slender, the limb elongate, slightly enlarged, shortly 5-fid. Anther-bases sagittate, with minute auricles; tails capillary, simple or branched. Style-arms of ☿ flowers linear, obtuse, slightly flattened, a little broader upwards. Pappus double, the outer row of short jagged teeth or a fimbriate cup; inner of smooth, scabrid or bearded, filiform or flattened hairs, often caducous. Achenes terete or ribbed.—DISTRIB. Europe, Africa, and Asia, abundant in the Mediterranean region; species about 24.

Involucre-bracts subequal; achenes sparsely hairy.
- Ray-flowers ligulate.
  - 1–2 ft. high; peduncles thickened upwards ..... 1. *P. Wightiana.*
  - Less than 1 ft. high; peduncles not thickened upwards ... 2. *P. angustifolia.*
- Ray-flowers tubular ..... 3. *P. foliolosa.*

Inner involucre-bracts much longer than the outer; ligules 0; achenes densely silky.
- Heads peduncled.
  - Leaves 1–2 in. long, glabrous or nearly so; heads ¼ in. in diam. ..... 4. *P. glaucescens.*
  - Leaves ½–1 in. long, woolly; heads ½ in. in diam. ..... 5. *P. Boissieri.*
- Heads subsessile, ¼ in. in diam.; leaves ¼–½ in. long ..... 6. *P. Stocksii.*

1. **Pulicaria Wightiana,** *C. B. Clarke, Comp. Ind.* (1876) p. 128. Annual, 1–2 ft. high, branched from about the middle of the stem; branches ascending, straight, slender, sometimes angled, pubescent, leafy, the leaves on the branches nearly erect, smaller upwards. Leaves 1–3 by ¼–⅝ in., sessile, oblong, usually serrate, more or less puberulous or pubescent on both sides. Heads solitary, ½–¾ in. in diam., on pubescent leafy peduncles which are thickened upwards. Outer involucre-bracts subherbaceous, linear-oblong, subacute, pubescent, inner bracts scarious, linear-lanceolate, acute, usually slightly longer than the outer. Ray-flowers ligulate, the ligules longer than the bracts, $\frac{1}{10}$ in. broad, yellow, spreading, at length recurved, shortly 3-toothed at the apex. Outer row of pappus a setuloso-laciniate cup, inner row of barbellate hairs which are ultimately reddish. Achenes $\frac{1}{16}$ in. long, oblong, terete

or scarcely quadrangular, brown, shining, nearly glabrous. Fl. B. I. v. 3, p. 298; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649. *Callistephus Wightianus*, DC. Prodr. v. 5 (1836) p. 275; Wight, Icon. t. 1089; Dalz. & Gibs. p. 123.—Flowers: Sept.

KONKAN: *Stocks!*, *Lambert!* DECCAN: common, *Dalzell & Gibson*, widely, *Woodrow*; Poona, *Cooke!*, *Kanitkar!*—DISTRIB. India (W. Peninsula).

2. **Pulicaria angustifolia,** *DC. Prodr.* v. 5 (1836) p. 479. A glaucous variable annual, 3–9 in. high (rarely higher), branched from the base; branches ascending, pubescent. Leaves sessile, linear-oblong or obovate, entire or serrulate, ¾–2 by ⅛–½ in., pubescent or the lower almost glabrous. Heads ⅜–½ in. in diam.; peduncles pubescent, not thickened upwards. Outer invol.-bracts subfoliaceous, linear-oblong, subobtuse, pubescent, inner bracts scarious, acute, usually slightly longer than the outer. Ray-flowers ligulate, yellow, the ligules longer than the bracts. Outer row of pappus a setuloso-laciniate cup; inner row of barbellate hairs reddish in fruit. Achenes terete, scarcely quadrangular, with a few minute scattered hairs. Fl. B. I. v. 3, p. 299; C. B. Clarke, Comp. Ind. p. 129; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649. *Callistephus concolor*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 344; Dalz. & Gibs. p. 123.—Flowers: Nov.-Dec.

KONKAN: *Law!*; Malwan, *Dalzell!* GUJARAT: Porbandar, *Woodrow*; Veráwal, *Cooke!* SIND: *Bhola Puran!*, *Stocks!*, *Dalzell*, 51!; near Karachi, *Cooke!*; Jemadar ka Landa near Karachi, *Stocks*, 1193!—DISTRIB. India (Bengal, Chota Nagpore, W. Peninsula); Beluchistan.

3. **Pulicaria foliolosa,** *DC. Prodr.* v. 5 (1836) p. 480. Annual, erect, much-branched, 1–2 ft. high; stem and branches pubescent. Leaves sessile, 1–3½ by ¼–¾ in., linear-oblong or oblanceolate, viscidly hairy, base ½-amplexicaul. Heads small, woolly and glandular; peduncles slender, hairy. Invol.-bracts very narrow, almost setaceous, subequal, hairy, very acute. Ray-flowers filiform, tubular, 3-toothed. Outer row of pappus a minute toothed membranous cup, the inner row of few white hairs about twice as long as the achenes. Achenes minute, oblong, terete, sparsely appressedly hairy. Fl. B. I. v. 3, p. 298; C. B. Clarke, Comp. Ind. p. 128; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Watt, Dict. Econ. Prod. v. 6, part 1, p. 364.—Flowers: Nov.–Jan. VERN. *Kakro.*

KONKAN: *Law!* DECCAN: Dehu (Poona districts), *Raoji!*; 14 miles N. of Poona, *Woodrow!* SIND: Hyderabad, *Kanitkar!*—DISTRIB. India (Bengal, Oude, the Gangetic plain, Central India).

4. **Pulicaria glaucescens,** *Jaub. & Spach, Ill. Pl. Orient.* v. 4 (1853) t. 349. A dwarf shrub 6–12 in. high; stem woody, branched; branches ash-colored, sparsely hairy or glabrous. Leaves 1–2 in. long, fleshy, straight or slightly curved, scattered, sessile, glabrous or nearly so, linear or linear-spathulate, margins flat or involute, quite entire. Heads ⅓ in. in diam.; peduncles short, glabrous, or pubescent near the top. Invol.-bracts glabrous, lanceolate, acute, rigid, the outer much the shorter. Ligules 0. Pappus white or straw-colored, shining, the outer scarcely distinguishable from the hairs on the achenes with which it appears continuous, the inner row of flattened hairs longer than the

flowers. Achenes short, oblong, silky. Fl. B. I. v. 3, p. 300; C. B. Clarke, Comp. Ind. p. 130; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649.

Rare. SIND: *Cooke*!, *Woodrow*!, *Dalzell*!—DISTRIB. India (Panjáb); S. Persia, Beluchistan.

5. **Pulicaria Boissieri,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 300. Dwarf, shrubby, villous with long white hairs. Leaves sessile, fleshy, ½–1 in. long, linear-spathulate, woolly, entire or sparsely toothed, margins flat or involute. Heads ½ in. in diam.; peduncles short. Invol.-bracts lanceolate, acute, rigid, the outer much the shorter. Ligules 0. Pappus white or yellowish, the outer coroniform, the inner much longer than the achenes, slightly flattened. Achenes short, oblong, silky. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649. *Platychæte villosa*, Boiss. Fl. Orient. v. 3, p. 208.

SIND: *Stocks*, 437!, *Dalzell*!, *Woodrow*.

6. **Pulicaria Stocksii,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 300. Dwarf, shrubby, pubescent, blackish when dry. Leaves sessile, ¼-½ in. long, linear-spathulate, very fleshy, entire. Heads subsessile, ¼ in. in diam. Invol.-bracts rigid, lanceolate, puberulous, the outer obtuse, much shorter than the inner, the inner acute. Ligules 0. Pappus white, the outer row short, coroniform, the inner much longer than the achenes. Achenes narrowed at the base, densely silky, 1/16 in. long. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649.—Flowers: Oct.

SIND: *Stocks*!, *Woodrow*. A rare plant.

I have seen but one specimen, which was collected in Sind by Stocks.—DISTRIB. Apparently endemic.

25. CÆSULIA, Roxb.

A glabrous marsh herb. Leaves alternate, remotely serrulate. Heads axillary, sessile; flowers all ♀, fertile, pale-blue or white, the outer often subracemosely stipitate or sessile, the inner sessile. Involucre large, membranous; bracts 2, orbicular or ovate. Receptacle with a few paleæ to the outer flowers, naked in the centre, glabrous. Corollas tubular; the limb narrowly campanulate, deeply 5-fid. Anther-bases sagittate; tails slender, consisting of a small bundle of fine hairs which cling together. Style-arms short, clavate. Pappus of 2 ovate scales. Achenes flat, obovoid, notched, winged on each side, sparsely hairy.—DISTRIB. East Indies; species 1.

1. **Cæsulia axillaris,** *Roxb. Hort. Beng.* (1814) p. 62. A succulent prostrate or suberect herb, 6–18 in. high; stem stout, more or less branched, striate, glabrous. Leaves sessile, 1½–6 by 3/16–1 in., lanceolate, acute, distantly serrulate, narrowed at the base, glabrous. Heads axillary, sessile; flowers pale-blue or white; outer flowers often subracemosely stipitate or sessile, irregularly intermixed with linear, acute bracteoles (*paleæ*); inner flowers sessile, without interspersed paleæ. Receptacle glabrous, sparsely paleaceous. Involucre large, membranous; bracts 2, orbicular or broadly ovate, crenulate or dentate, with a dorsal apiculus near the apex. Corollas tubular, the limb slightly enlarged with 5 linear lobes 1/16 in. long. Anthers black (*Ritchie*); bases

sagittate; tails slender, consisting of a small bundle of fine hairs which cling together. Pappus-scales 2, ovate, ribbed at the back, the rib produced into an apiculus. Achenes $\frac{1}{10}$–$\frac{1}{8}$ in. long by about $\frac{1}{12}$ in. broad at the apex (including the wing), flat, obovoid, notched and with a few small teeth at either side of the notch, broadly winged on each of the sides and sometimes with a rib on each of the flat faces which are sparsely studded with short stout white hairs. Fl. B. I. v. 3, p. 291; Grah. Cat. p. 96; Dalz. & Gibs. p. 126; Roxb. Cor. Pl. v. 1, p. 64, t. 93; Wight, Icon. t. 1102; C. B. Clarke, Comp. Ind. p. 116; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 648.—Flowers: Sept.–Jan. VERN. *Máká.*

Roxburgh has apparently taken the pappus-scales to be a partial involucre, but they are inserted at the top of the achene. Roxburgh's drawing is incorrect as to the style-arms also. Wight shews these correctly.

KONKAN: *Lambert*! DECCAN: Poona, *Woodrow*!; Kirkee, *J. G. Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 409!; Hubli, *Hohenhacker*, 744!—DISTRIB. Throughout the greater part of India in rice-fields.

26. **LAGASCA,** Cav.

Rigid villous or subglabrous herbs. Leaves opposite or the upper alternate, entire or toothed. Heads 1-flowered, in leafy balls which are solitary terminal and peduncled, or in corymbose panicles. Flowers all ☿, fertile, white, red or yellow. Involucre tubular; bracts 5, connate. Receptacle small. Corolla regular; tube short; limb elongate, cylindric or dilated above, 5-fid. Anther-bases sagittate; auricles obtuse. Style-arms elongate, subacute, hairy. Pappus a toothed or fimbriate cup or ring. Achenes cuneate, compressed or 3-angled, tip rounded.—DISTRIB. Mexico and Central America; species 7.

The genus was named *Lagasca* by Cavanilles, not *Lagascea.*

1. **Lagasca mollis,** *Cav. in Anal. Cienc. Nat.* v. 6 (1803) p. 332, t. 44. A tall slender herb; stem and branches pale, slender, striate, terete, pubescent. Leaves 1–2 by $\frac{1}{2}$–$1\frac{1}{4}$ in., ovate, acute or acuminate, crenate, silky beneath and with somewhat coarser hairs above, base shortly cuneate; petioles $\frac{3}{8}$–1 in. long, densely pubescent. Heads in clusters (resembling simple heads), $\frac{3}{4}$–1 in. in diam., silky-villous, with an involucre of elliptic acute or acuminate very silky leaves; flowers white; peduncles long, slender, pubescent. Involucre-bracts $\frac{1}{4}$–$\frac{5}{16}$ in. long, connate for about $\frac{1}{2}$-way up into a tube, lanceolate, very acute, ciliate. Corolla-tube short; limb 5-fid, the segments linear, acute, about as long as the tube, pubescent outside near the tip. Style-arms long, hairy. Pappus a short fimbriate cup. Achenes cuneate, $\frac{1}{12}$ in. long. Fl. B. I. v. 3, p. 302; Grah. Cat. p. 96; Dalz. & Gibs. Suppl. p. 46; C. B. Clarke, Comp. Ind. p. 131; Trim. Fl. Ceyl. v. 3, p. 34; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649.—Flowers nearly all the year. VERN. *Jharvad.*

A native of Central America, but completely naturalized in the Bombay Presidency, especially in the Deccan, where it has, in the Poona districts, become a most troublesome weed, spreading rapidly and seriously interfering with the growth of the grass in some talukas.

27. **XANTHIUM,** Linn.

Annual coarse rough herbs unarmed, or with 3-fid spines. Leaves alternate, toothed or lobed. Heads monœcious (♀ and ☿), axillary, the ☿ in the upper axils, globose, many-flowered, sterile, tubular, 5-toothed, the ♀ 2-flowered, apetalous, fertile. HEADS OF ☿ FLOWERS: Involucre short; bracts few, 1–2-seriate, narrow. Receptacle cylindric, with hyaline cuneate or linear-spathulate paleæ enclosing the flowers. Corollas tubular, enlarged into a 5-toothed limb. Anthers distinct, bases obtuse, tips mucronate, inflexed; filaments monadelphous. Style undivided, slender, slightly dilated at the apex. Achenes rudimentary. HEADS OF ♀ FLOWERS: Invol.-bracts united into an ovoid 2-beaked herbaceous 2-celled utricle (with 1 flower in each cell), enlarging in fruit, with hooked bristles and with sometimes a few small free outer bracts. Corollas 0. Style-arms exserted from the beaks of the involucre. Pappus 0. Achenes completely enclosed in the indurated cells of the enlarged involucre (like seeds in a capsule), compressed, obovoid, thick.—DISTRIB. Species 4 of uncertain origin, but probably all American.

1. **Xanthium strumarium,** *Linn. Sp. Pl.* (1753) p. 987. Annual, unarmed; stem short, stout, slightly branched, rough with short hairs. Leaves numerous, 2–3 in. long and almost as broad as long, broadly triangular-ovate or suborbicular, acute, often 3-lobed, rough with appressed hairs on both sides, irregularly inciso-serrate, somewhat cordate and shortly cuneate at the base; petioles 1–3 in. long, hairy. Heads in terminal and axillary racemes, the barren heads rather numerous, crowded at the top of the stem, the fertile heads fewer, axillary. Involucre of fertile heads ovoid in fruit, about $\frac{5}{8}$ in. long, with 2 erect mucronate beaks, pubescent, thickly clothed with usually hooked prickles, 2-celled, hard and tough. Achenes $\frac{1}{2}$ in. long, oblong-ovoid, compressed, glabrous. Fl. B. I. v. 3, p. 303; C. B. Clarke, Comp. Ind. p. 132; Oliver, Fl. Trop. Afr. v. 3, p. 371; Trim. Fl. Ceyl. v. 3, p. 35; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Watt, Dict. Econ. Prod. v. 6, part 4, p. 318. *Xanthium indicum,* DC. in Wight, Contrib. p. 17; Grah. Cat. p. 101; Dalz. & Gibs. p. 127.—Flowers: Jan.–Feb. VERN. *Shankeshvar.*

KONKAN: *Stocks*!, *Law*!; Bombay below Parel flagstaff, *Graham.* DECCAN: Poona, *Cooke*!, *Woodrow*!; banks of Moola river, Kirkee, *J. G. Woodrow*!; Gokak Falls, *Ritchie,* 1812!—DISTRIB. Throughout India; Ceylon and warmer parts of the world.

The fruit is employed in native medicine. See Watt, Dict. Econ. Prod. l. c.

28. **SIEGESBECKIA,** Linn.

Herbs, usually annual, more or less glandular-pubescent. Leaves opposite, toothed. Heads small, in leafy lax panicles, heterogamous, subradiate, yellow or white; ray-flowers ♀, fertile, 1-seriate; disk-flowers ☿, fertile or the inner sterile. Involucre campanulate or hemispheric; bracts few, herbaceous, glandular, the exterior (usually 5) linear-cuneate, spreading, the inner enclosing the ray-flowers. Receptacle small; paleæ membranous, concave, often enclosing the flowers. Corollas of ♀ flowers with a short tube and 2–3-fid limb, those of the ☿ flowers tubular, the limb campanulate and 5-fid, or narrow and 3–4-

toothed. Anther-bases entire. Style-arms of ☿ flowers short, flattened, subacute. Pappus 0. Achenes obovoid-oblong, not compressed, often incurved, obtuse.—DISTRIB. Species 2, one widely spread throughout tropical and subtropical regions, the other Peruvian.

1. **Siegesbeckia orientalis,** *Linn. Sp. Pl.* (1753) p. 900. A large annual herb 2–4 ft. high; stem stiff, erect, with horizontal branches below and dichotomously branched ones above; stem and branches tinged with purple, terete, pubescent. Leaves opposite, 2–5 by 1¼–2¾ in., triangular-ovate, acute or acuminate, deeply and irregularly toothed, the uppermost leaves much smaller and nearly entire, all finely pubescent on both sides, base cuneate, running down wing-like into a somewhat obscure petiole. Heads small, peduncled, in leafy panicles; flowers yellow, those of the ray red beneath. Invol.-bracts in 2 rows, very dissimilar; the 5 outer exceeding ½ in. long, linear-spathulate or clavate, horizontally spreading with recurved margins, the upper surface covered with large viscous glandular hairs; the 5 inner bracts short, boat-shaped, obtuse, glandular-hairy on the back, each bract enclosing one of the ray-flowers. Ray-flowers usually 5, ligulate, the ligules recurved, 3-toothed at the apex. Pappus 0. Achenes each enclosed in a boat-shaped bract, glabrous, slightly rough, black. Fl. B. I. v. 3, p. 304; Grah. Cat. p. 100; Dalz. & Gibs. p. 127; Wight, Icon. t. 1103; Trim. Fl. Ceyl. v. 3, p. 36; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649. —Flowers: Nov.-Dec. VERN. *Katampu.*

DECCAN: common, *Graham*; Poona, *Cooke*!; island in the Poona river, *Woodrow*!; Panchgani, near the caves, *Woodrow*! S. M. COUNTRY: Belgaum, *Dalzell & Gibson*, *Ritchie*, 1095!—DISTRIB. Throughout India; Ceylon, most tropical and subtropical regions of both hemispheres.

29. **ECLIPTA,** Linn.

Annual or perennial herbs, diffuse or erect, branched, more or less strigose. Leaves opposite. Heads small, axillary or terminal, peduncled, heterogamous, rayed; ray-flowers ♀, sub-2-seriate, fertile or sterile, white or yellow; disk-flowers ☿, fertile. Involucre hemispheric or broadly campanulate; bracts sub-2-seriate, herbaceous, subequal or the inner shorter. Receptacle flat or somewhat convex, the paleæ narrow, enclosing several flowers, the innermost very narrow, or 0. Corollas of ♀ flowers ligulate, spreading, ligules small narrow, entire or 2-toothed; the corollas of the ☿ flowers regular, tubular, the limb shortly 4-5-fid. Anther-bases obtuse, subentire. Style-arms flattened, terminated by short or triangular obtuse appendages. Achenes of the ray narrow, triquetrous, often empty, those of the disk laterally subcompressed, top entire, toothed or 2-aristate.—DISTRIB. Species 3 or 4, one common throughout the warmer regions of the globe, another Australian, and a third S. American.

1. **Eclipta erecta,** *Linn. Mantiss.* v. 2 (1771) p. 286. Annual, erect or prostrate, branched, often rooting at the nodes; stem and branches strigose with appressed white hairs. Leaves sessile, 1–3 in. long, variable in breadth, usually oblong-lanceolate, subentire, acute or subacute, sparsely strigose with appressed hairs on both sides, base tapering. Heads ¼–⅓ in. in diam., solitary or 2 together on unequal

axillary peduncles. Involucre-bracts about 8, ovate, obtuse or acute, herbaceous, strigose with appressed white hairs. Ray-flowers ligulate, the ligule small, spreading, scarcely as long as the bracts, not toothed, white. Disk-flowers tubular, the corollas often 4-toothed. Pappus 0, except occasionally very minute teeth on the top of the achene. Achenes cuneate, compressed and with a narrow wing, covered with warty excrescences. Jackson, in Index Kewen. v. 2, p. 821; Dalz. & Gibs. p. 127; Aitch. Pb. & Sind Pl. p. 75. *Eclipta prostrata*, Linn. Mantiss. v. 2, p. 286; Grah. Cat. p. 99; Dalz. & Gibs. p. 127. *Eclipta alba*, Haask. Pl. Jav. Rar. (1848) p. 528; Hook. f. Fl. B. I. v. 3, p. 304; C. B. Clarke, Comp. Ind. p. 134; Trim. Fl. Ceyl. v. 3, p. 37; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Watt, Dict. Econ. Prod. v. 3, p. 201.—Flowers: Oct.-Dec. VERN. *Máká*; *Bhángrá*.

There are two forms of the plant, one erect and the other prostrate, but otherwise not differing. Both are pretty common in the Bombay Presidency. KONKAN: Kalyan, *Woodrow*. DECCAN: Poona, *Cooke*! SIND: *Stocks*!, *Bhola Puran*!; Karachi, *Woodrow*.

The plant is of considerable repute in native medicine. See Watt, Dict. Econ. Prod. l. c.—DISTRIB. India (Bengal, Birma, Central India, Panjáb, W. Peninsula); Ceylon, Malaya, cosmopolitan in warm climates.

30. **SCLEROCARPUS,** Jacq.

Annual or perennial branched herbs, strigose or villous. Leaves alternate or the lower (rarely all) opposite. Heads terminal, or in the forks or leaf-opposed, heterogamous, rayed, yellow; ray-flowers neuter, 1-seriate; disk-flowers ☿, fertile. Involucre campanulate; bracts few, 2-seriate, all or the tips herbaceous, the outer spreading. Receptacle convex or conic, the paleæ enfolding the base of the ☿ flowers, at length closed above the achenes, indurated and deciduous with them. Corollas of the ray-flowers ligulate, the ligules spreading, entire or scarcely toothed; corollas of the ☿ flowers regular, tubular, the limb slightly enlarged, 3–5-fid. Anther-bases subentire. Style-arms of ☿ flowers elongate, acute, obtuse or subclavate. Pappus 0 or a short ring. Achenes obovoid, subcompressed, glabrous, narrowed below, enclosed in the rugose often beaked paleæ.—DISTRIB. Tropical America, Africa, and Asia; species about 11.

1. **Sclerocarpus africanus,** *Jacq. Icon. Pl. Rar.* v. 1 (1782) p. 17, t. 176. Annual, erect, 1–3 ft. high; stem and branches terete, striate, more or less hispid. Leaves 1–3½ by ½–1¾ in., mostly alternate, ovate, acute, clothed on both sides with appressed hairs, remotely serrate, 3–5-nerved, base shortly cuneate; petioles up to ½ in. long. Heads ⅓–½ in. in diam., sessile or peduncled, terminal or leaf-opposed, supported usually by 2 or 3 floral leaves. Involucre-bracts foliaceous, linear-oblong, obtuse, hairy. Ray-flowers few, ligulate, neuter. Corollas of disk-flowers elongate; lobes lanceolate, acute. Paleæ of the receptacle boat-shaped, enclosing the curved gibbous ribbed achenes. Fl. B. I. v. 3, p. 305; Dalz. & Gibs. p. 129; Oliver, Fl. Trop. Afr. v. 3, p. 374; C. B. Clarke, Comp. Ind. p. 134; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649.—Flowers: July–Aug.

KONKAN: *Stocks*! DECCAN: highest hills round Junnar, *Dalzell & Gibson*; Kadakvasla, *Woodrow*!; hill 14 miles W. of Poona, *Krishna*!; Nasik, *Woodrow*. GUJARAT:

Porbandar (Kathiawar), *Cooke*!—Distrib. India (W. Himalaya, Panjáb, W. Peninsula); Tropical Africa.

31. **BLAINVILLEA,** Cass.

Erect branched scabrid or villous herbs. Leaves opposite or the upper alternate, petiolate. Heads small, subsessile or peduncled, terminal or axillary, heterogamous, rayed or subdisciform, yellow; ray-flowers ♀, fertile, 1–2-seriate; disk-flowers ☿, fertile. Involucre ovoid-campanulate or at length subglobose; bracts few, slightly unequal, the exterior herbaceous, the inner passing into the paleæ of the receptacle. Receptacle small, subconvex, furnished with rigidly membranous folded or concave paleæ. Corollas of ♀ flowers either ligulate with small spreading ligules 2–3-toothed, or slender with a short irregularly or subregularly 2–3-fid limb; corollas of ☿ flowers regular, tubular, with an enlarged or campanulate shortly 5-fid limb. Anther-bases obtuse, entire. Style-arms of ☿ flowers narrow, flattened, with acute or subobtuse appendages. Pappus of 2–5 unequal (sometimes subpaleaceous) bristles connate at the base. Achenes truncate, those of the ray triquetrous or dorsally compressed, those of the disk laterally compressed or obtusely 3–4-angled.—Distrib. Tropical regions of the whole world; species about 10.

1. **Blainvillea rhomboidea,** *Cass. in Dict. Sc. Nat.* v. 29 (1823) p. 494. Annual, 1–2 ft. high, hispidly hairy. Stem striate, subterete; branches numerous, ascending, scabrous. Leaves 1¾–3 by 1–2 in., ovate or ovate-lanceolate, alternate or opposite, acute, crenate-serrate, hispidly hairy, 3-nerved, base cuneate; petioles ½–¾ in. long, hairy. Heads ⅓–½ in. in diam., in erect terminal cymes; peduncles variable in length, slender, hairy. Outer invol.-bracts herbaceous, ovate-oblong, subacute, pubescent; inner slightly larger, passing into the paleæ of the receptacle, subscarious, rigid, broadly oblong, pectinate at the truncate apex, longitudinally striate with green nerves, pubescent, persistent after the fall of the fruit. Ray-flowers very short and inconspicuous; ligules yellow or whitish, bifid. Pappus of a few unequal acute scales, rarely short bristles. Achenes of the ray cuneiform, triquetrous, slightly curved, ⅛ in. long; achenes of the disk triquetrous or compressed, cuneiform, pubescent, nearly straight, ⅛ in. long. Jackson, in Index Kewen. v. 1, p. 310. *Blainvillea latifolia*, DC. in Wight, Contrib. (1834) p. 17; Dalz. & Gibs. p. 127; Hook. f. Fl. B. I. v. 3, p. 305; C. B. Clarke, Comp. Ind. p. 135; Trim. Fl. Ceyl. v. 3, p. 37; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Aitch. Pb. & Sind Pl. p. 75. —Flowers: Aug.–Sept.

Deccan: Poona, *Cooke*!, *Woodrow*!; Bowdhán jungles 10 miles W. of Poona, *Kanitkar*! Sind: *Stocks* ex *Aitch.*—Distrib. Throughout the greater part of India; Ceylon, Java, Africa, America, and Australia.

32. **WEDELIA,** Jacq.

Herbs or undershrubs, scabrid-pubescent or hirsute. Leaves opposite, usually toothed. Heads axillary or terminal, heterogamous, rayed, yellow; ray-flowers ♀, fertile; disk-flowers ☿, fertile or the inner sterile. Involucre ovoid, campanulate, or subhemispheric; bracts sub-

2-seriate, the exterior 3–5, usually herbaceous or foliaceous, the inner dry or rigidly membranous. Receptacle flat or convex, furnished with folded or concave paleæ embracing the ☿ flowers. Corollas of ♀ flowers ligulate, the ligules spreading, entire or 2–3-toothed; corollas of ☿ flowers regular, tubular, with an elongate 5-toothed limb. Anther-bases entire or sagittate, with small blunt auricles. Style-arms of ☿ flowers short or elongate, with subacute hairy tips. Pappus 0 or a toothed cup or ring, or of short scales. Achenes cuneate-oblong or obovoid, thick, laterally compressed or the outer triquetrous, tip rounded, margins obtuse or thickened.—DISTRIB. Warmer regions of both hemispheres; species about 45.

Invol.-bracts much longer than the disk-flowers; leaves subsessile, lanceolate-oblong	1. *W. calendulacea.*
Invol.-bracts about equalling the disk-flowers; leaves petioled, ovate.	
An erect herb; achenes ⅛ in. long	2. *W. urticæfolia.*
A climbing shrub; achenes ⅛ in. long	3. *W. biflora.*

1. **Wedelia calendulacea,** *Less. Syn. Comp.* (1832) p. 222. A perennial herb 1–3 ft. high; stem procumbent at the base and rooting at the lower nodes, terete, more or less appressedly hairy. Leaves opposite, subsessile, 1–3 by ⅜–1⅛ in., lanceolate-oblong, entire or irregularly crenate-serrate, scabrous with short white hairs or at length more or less glabrate, base tapering. Heads ¾–1¼ in. in diam., solitary; peduncles 1–6 in. long, erect, slender, slightly thickened beneath the heads. Invol.-bracts herbaceous, oblong or slightly obovate, hairy, subobtuse, much longer than the disk-flowers. Ray-flowers ligulate, ligules yellow, 2–3-toothed. Style-arms of ♀ flowers long, acute, recurved. Pappus a toothed membranous cup. Achenes of the ray tapering, slightly pubescent. Fl. B. I. v. 3, p. 306; Dalz. & Gibs. p. 128; Wight, Icon. t. 1107; Arn. in Hook. Comp. Bot. Mag. v. 1, p. 81, t. 5; C. B. Clarke, Comp. Ind. p. 136; Trim. Fl. Ceyl. v. 3, p. 38; Watt, Dict. Econ. Prod. v. 6, part 4, p. 301. *Verbesina calendulacea,* Linn. Sp. Pl. (1753) p. 902; Grah. Cat. p. 100.—Flowers: Feb.–May. VERN. *Pivala-bhángrá.*

This plant has been included on the authority of *Graham* l. c. and *Dalzell & Gibson* l. c. I have seen no specimens from Bombay, and the plant does not appear to have been found by any recent collectors in that Presidency. It is not included in *Woodrow's* list, and there are no specimens from the Bombay Presidency in Herb. Kew.

KONKAN: in moist places, ex *Graham* l. c.—DISTRIB. India (Bengal, Assam, Birma, W. Peninsula); Ceylon, Malay Islands, China, Japan.

2. **Wedelia urticæfolia,** *DC. in Wight, Contrib.* p. 18, Var. *β. Wightii.* A weak erect herb; branches light-colored, terete, slightly grooved, pubescent or scabrid. Leaves opposite, 3–6 by ¾–2 in., ovate, acute or acuminate, closely and sharply serrate, strigosely hispid on both sides, base rounded or subacute; petioles ¼–¾ in. long. Heads ¾–1 in. in diam., solitary or 2–3 together; peduncles densely hairy. Outer invol.-bracts ovate-oblong, acuminate, hairy, about equalling the disk-flowers. Ray-flowers ligulate, the ligules sometimes exceeding ¼ in. long by ⅛ in. wide, 2-fid at the apex. Pappus a small toothed ciliolate cup. Achenes elongate, cuneate, 3-quetrous, truncate at the apex, nearly

glabrous, $\frac{1}{5}$ in. long. Fl. B. I. v. 3, p. 306; Wight, Icon. t. 1106; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649. *Wollastonia biflora*, Dalz. & Gibs. p. 128, exclud. syn. (*not* of DC.). *Verbesina biflora*, Wall. Cat. 3207, B, in part; Grah. Cat. p. 100.—Flowers: Aug.-Sept.

KONKAN: *Law*!, *Dalzell*!; near Marmagao, *Cooke*! DECCAN: Junnar, *Woodrow*!; Poona, *Woodrow*. S. M. COUNTRY: Cheeta hill 4 miles S. of Belgaum, *Ritchie*, 380! KANARA: Kulgi (N. Kanara), *Talbot*, 2416!—DISTRIB. India (W. Peninsula); Malayan Archipelago.

3. **Wedelia biflora,** *DC. in Wight, Contrib.* (1834) p. 18 (*not* of C. B. Clarke). A rambling climbing shrub growing near the sea; stem semi-woody below, with opposite horizontal striate glabrous or pubescent branches. Leaves opposite, $2\frac{1}{2}$-$5\frac{1}{2}$ by 1-3 in., ovate, acute or acuminate, rather distantly serrate, rough with appressed hairs on both sides, base usually cuneate; petioles $\frac{1}{8}$-2 in. long, pubescent. Heads $\frac{1}{2}$-$\frac{3}{4}$ in. in diam., usually 3 together at the ends of the branches; peduncles long, unequal, glabrous or pubescent. Invol.-bracts oblong-lanceolate, about equalling the disk-flowers, pubescent. Ray-flowers ligulate, ligules yellow, 2-3-toothed at the apex. Pappus usually 0. Achenes 3 (sometimes 4)-angled, $\frac{1}{8}$ in. long, cuneate, more or less tubercled, glabrous except at the truncate apex where they are minutely pubescent. Fl. B. I. v. 3, p. 306; Trim. Fl. Ceyl. v. 3, p. 39; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649. *Wedelia scandens*, C. B. Clarke, Comp. Ind. p. 136 (exclud. syn. *W. Horsfieldiana*). *Wollastonia biflora* and *scabriuscula*, DC. Prodr. v. 5, pp. 546 & 547; Wight, Icon. t. 1108.—Flowers: Dec. VERN. *Sonki*.

Very close to the last species, from which it differs in its climbing habit, in being much less hairy, and in its shorter and broader achenes.

On the sea-coast. KONKAN: near Marmagao, *Woodrow*.—DISTRIB. Tropical shores of Eastern Asia.

33. **SPILANTHES,** Linn.

Annual herbs. Leaves opposite, usually toothed. Heads usually on long peduncles, axillary or terminal, heterogamous and rayed or homogamous and disciform; ray-flowers ♀, fertile, 1-seriate; disk-flowers ☿, fertile. Involucre short, ovoid or campanulate; bracts sub-2-seriate, slightly unequal. Receptacle convex, elongate; paleæ folded, enclosing the ☿ flowers, often contracted with the ovary into a stalk. Corollas of ♀ flowers ligulate, ligules small, white or yellow, spreading, entire or 2-3-toothed; corollas of ☿ flowers regular, tubular, the limb enlarged or narrowly campanulate, 4-5-fid. Anther-bases truncate, entire or rarely minutely 2-toothed. Style-arms of ☿ flowers rather long, truncate. Pappus 0 or of 2-3 bristles. Achenes of the ray 3-quetrous or dorsally compressed, those of the disk laterally compressed, usually ciliate at the margins or angles.—DISTRIB. Chiefly Tropical American; species about 20.

1. **Spilanthes Acmella,** *Murr. Syst. Veg.* ed. 13 (1774) p. 610. Annual, erect or ascending; stem and branches more or less hairy. Leaves opposite, 1-2 by $\frac{1}{2}$-$1\frac{1}{2}$ in., ovate, acute or subobtuse, irregularly crenate-serrate or sometimes entire, glabrous or nearly so, base usually acute; petioles $\frac{1}{4}$-$\frac{5}{8}$ in. long, pubescent. Heads $\frac{1}{4}$-$\frac{1}{2}$ in. long, ovoid,

solitary or subpanicled; peduncles sometimes reaching or even exceeding 4 in. long. Involucre-bracts oblong-lanceolate, subacute, pubescent, less than half as long as the head of flowers. Ray-flowers and ligules very often absent, the latter when present minute. Pappus 0. Achenes oblong or slightly obovoid, truncate, much compressed, nearly glabrous. Fl. B. I. v. 3, p. 307; Grah. Cat. p. 99; Dalz. & Gibs. p. 129; C. B. Clarke, Comp. Ind. p. 138; Trim. Fl. Ceyl. v. 3, p. 40; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Watt, Dict. Econ. Prod. v. 6, part 3, p. 329. *Spilanthes calva*, DC. Prodr. v. 5, p. 625; Wight, Icon. t. 1109.—Flowers: Nov. VERN. *Akkalkára.*

KONKAN: *Stocks*!, *Law*! DECCAN: Mahableshwar, *Cooke*!; Kolhapur, *Cooke*! S. M. COUNTRY: Belgaum, *Cooke*!, *Ritchie*, 1809!; Chorla Ghát, *Dalzell & Gibson*. KANARA: Yellur, *Ritchie*, 1809!—DISTRIB. Throughout India; Ceylon, all warm countries.

The flower-heads when chewed have a hot burning taste and cause profuse salivation.

34. GLOSSOCARDIA, Cass.

An annual diffuse branched glabrous herb. Leaves alternate, slender, 1–2-pinnatisect. Heads small, terminal or axillary, often numerous, pedunculate, heterogamous, rayed, yellow; ray-flowers ♀, usually solitary, fertile; disk-flowers ☿, few, fertile, tubular. Involucre oblong; bracts few; the exterior 1–3, small; the inner 3–5, with membranous margins. Receptacle flat, with a few flat paleæ interspersed among the flowers. Corollas of ♀ flowers ligulate, the ligules 2-fid; corollas of ☿ flowers regular, tubular, with a slightly enlarged or narrowly campanulate 4-fid limb. Anther-bases obtuse, entire. Style-arms of ☿ flowers with short linear acute hispid tips. Pappus of 2 small stiff awns. Achenes narrowly oblong, dorsally much compressed, ciliate and with bearded faces.—DISTRIB. East Indies; species 1.

1. **Glossocardia linearifolia,** *Cass. in Dict. Sc. Nat.* v. 19 (1821) p. 62. A small prostrate or erect annual, much branched from the base; stems and branches deeply grooved. Leaves ½–2 in. long, 2-pinnatisect; segments linear, apiculate; petioles variable in length, slender. Heads ⅜ in. long; paleæ of receptacle linear, acute, flat. Outer involucre-bracts usually 3, ovate-lanceolate, acute, about ⅛ in. long with membranous and slightly ciliate margins and a green midrib; inner involucre-bracts ¼–⅓ in. long, oblong, subobtuse, striate, glabrous and with pale membranous margins. Pappus of 2 stiff slightly divaricate awns. Achenes ¼ in. long, brown, narrowly oblong, much flattened, densely hairy on the edges and somewhat less densely so on the flat faces. Fl. B. I. v. 3, p. 308; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Watt, Dict. Econ. Prod. v. 3, p. 508. *Glossocardia Bosvallia*, DC. in Wight, Contrib. (1834) p. 19. *G. Bosvallea*, DC. Prodr. v. 5, p. 631; Dalz. & Gibs. p. 129; Wight, Icon. t. 1110; C. B. Clarke, Comp. Ind. p. 139. *G. Boswellia*, Grah. Cat. p. 100.—Flowers: Aug.–Oct. VERN. *Pitpápda*; *Phattarsuva.*

KONKAN: *Law*! DECCAN: Poona, *Cooke*!, *Woodrow*!; Kaladghi, *Law* ex *Graham*. S. M. COUNTRY: hills N. of Belgaum, *Ritchie*, 387! KANARA: *Law*!—DISTRIB. India (W. Peninsula, Central India).

35. **BIDENS,** Linn.

Annual or perennial herbs, sometimes scandent. Leaves opposite, toothed, incised, or 1–2-pinnate. Heads corymbosely panicled or subsolitary, heterogamous and rayed, or homogamous and disciform; ray-flowers when present 1-seriate, neuter or more rarely ♀; disk-flowers ☿, fertile. Involucre campanulate or subhemispheric; bracts sub-2-seriate, often shortly connate at the base; outer herbaceous, short or expanded into elongate leaves; inner membranous, often with white margins. Receptacle flat or somewhat convex; paleæ narrow, nearly flat, subtending the ☿ flowers. Corollas of ray-flowers ligulate, the ligules spreading, yellow or white; corollas of disk-flowers usually yellow, regular, tubular, with a 5-fid cylindric limb. Anther-cells entire at the base, or sagittate with blunt auricles. Style-arms of ☿ flowers hairy above; tips short, acute or subulate. Pappus of 2–4 rigid retrorsely hispid bristles, or 0. Achenes dorsally compressed or sub-4-gonous, obovoid-oblong or linear, often narrowed but not beaked above.—Distrib. Chiefly American; species about 50.

1. **Bidens pilosa,** *Linn. Sp. Pl.* (1753) p. 832. Annual, erect, glabrous or more or less pubescent, 2–3 ft. high; stems quadrangular, grooved; branches opposite. Leaves very variable, sometimes 3-foliolate, but (in the Bombay Presidency) usually consisting of 2 subopposite pairs of leaflets and a deeply 3-lobed terminal leaflet which is larger than the lateral ones, the lowest pair of leaflets sometimes again pinnately divided; ultimate leaflets subsessile, ovate, acute, serrate, glabrous; common petioles somewhat dilated and sheathing at the base. Heads reaching ½ in. in diam., elongating in fruit. Outer invol.-bracts herbaceous, oblong, subacute, shorter than the inner, ciliate and with scarious margins. Ray-flowers ligulate, white or yellow, ligules narrow, strap-shaped. Pappus of 2–4 rigid retrorsely hispid slightly spreading awns. Achenes ⅓–⅔ in. long, linear, quadrangular, slightly tapering towards the apex, glabrous. Fl. B. I. v. 3, p. 309; C. B. Clarke, Comp. Ind. p. 140; Trim. Fl. Ceyl. v. 3, p. 40; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650. *Bidens Wallichii,* DC. Prodr. v. 5, p. 598; Grah. Cat. p. 101; Dalz. & Gibs. p. 128.—Flowers nearly all the year.

I have not attempted to keep the var. *bipinnata,* Hook. f. Fl. B. I. l. c. (*B. Wallichii,* DC.), distinct from *B. pilosa.* The most common, indeed almost the only, form in the Bombay Presidency is this variety, but the leaves of the plant are so variable and so variously cut that I agree with Trimen (*l. c.*) that the variety is scarcely worth distinction.

Tolerably common in the Deccan plains and gardens. Deccan: Poona, *Ranade*!; Bowdhán jungles near Poona, *Kanitkar*!—Distrib. Throughout India; Ceylon and most warm countries.

36. **GLOSSOGYNE,** Cass.

Perennial glabrous herbs with almost naked stems and branches. Leaves mostly radical, crowded, pinnatifid, or cuneate and 3-toothed, the cauline leaves alternate, or the lower opposite or 0. Heads small, pedunculed, few, corymbose, heterogamous and rayed or homogamous and disciform; ray-flowers ♀, fertile; disk-flowers ☿, fertile. Involucre small; bracts 2–3-seriate, narrow, shortly connate at the base; the inner often larger and margined. Receptacle flat; paleæ scarious, flat or concave. Corollas of ♀ flowers ligulate, yellow (or white ?), the

ligules spreading, entire or coarsely 2–3-toothed; corollas of ☿ flowers yellow. Anther-bases obtuse. Style-arms of ☿ flowers with long hairy appendages. Pappus of 2 retrorsely scabrid bristles. Achenes dorsally compressed, linear or ovoid, sometimes almost winged, truncate at the apex, glabrous.—DISTRIB. Tropical Asia and Australia; species 5.

1. **Glossogyne pinnatifida,** *DC. in Wight, Contrib.* (1834) p. 19. Perennial, with a woody fusiform root; stems numerous from the root; branches chiefly from near the top, slender, forked. Leaves chiefly radical, erect, coriaceous, 1–2 in. long (including the petiole), pinnatifid; segments few, linear-oblong, subacute, entire, glabrous. Flowering branches 6–12 in. long, almost leafless, grooved, glabrous. Heads $\frac{1}{4}$–$\frac{5}{16}$ in. in diam., elongating in fruit. Involucre-bracts connate at the base, linear-oblong, obtuse. Ray-flowers ligulate, yellow, ligules 3-toothed. Pappus of 2 retrorsely scabrid spreading awns. Achenes $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-oblong, grooved, glabrous, dark-brown. Fl. B. I. v. 3, p. 310; Dalz. & Gibs. p. 129; C. B. Clarke, Comp. Ind. p. 141; Trim. Fl. Ceyl. v. 3, p. 41; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Watt, Dict. Econ. Prod. v. 3, p. 508.—Flowers: Sept.–Oct.

Rare in the Bombay Presidency. S. M. COUNTRY: *Dalzell & Gibson*; north of Dharwar, *Ritchie*, 1096!—DISTRIB. India (Western Bengal, Gangetic plain, Kumaon, W. Peninsula); Ceylon.

A preparation of the root has been used as a remedy in the case of snake-bite and scorpion-stings. See Watt, Dict. Econ. Prod. l. c.

37. **TRIDAX,** Linn.

Perennial herbs branched at the base. Leaves opposite, inciso-dentate or pinnatisect; segments few, narrow. Heads on very long peduncles, heterogamous, rayed; ray-flowers ♀, fertile; disk-flowers ☿, fertile. Involucre ovoid, campanulate or subhemispheric; bracts few-seriate, slightly unequal, the outer broad, herbaceous. Receptacle flat or convex; paleæ membranous. Corollas of ♀ flowers ligulate or sub-bilabiate, the outer lip large, 3-fid or 3-partite, the inner small, 2-lobed or 2-partite, or 0; corollas of ☿ flowers regular, tubular, the limb elongate, slightly enlarged at the apex, shortly 5-fid. Anthers sagittate, with short acute auricles at the base. Style-arms of ☿ flowers hairy above; tips subulate. Pappus paleaceous, the bristles numerous, aristato-acuminate, plumoso-ciliate, long or short. Achenes turbinate or oblong, more or less sericeo-villous.—DISTRIB. Tropical America; species 7, of which 1 species (the following) has been naturalized in India.

1. **Tridax procumbens,** *Linn. Sp. Pl.* (1753) p. 900. A straggling herb 1–2 ft. high; stem and branches hairy. Leaves 1–1$\frac{3}{4}$ by $\frac{3}{4}$–1 in., ovate-elliptic, acute, deeply inciso-dentate or pinnatisect, clothed on both sides with short hairs from glandular bases, base acute; petioles $\frac{3}{8}$–$\frac{1}{2}$ in. long, densely hairy. Heads $\frac{1}{2}$–$\frac{5}{8}$ in. in diam., solitary; peduncles very long, sometimes exceeding 12–14 in. long, slender, sparsely clothed with weak spreading white hairs. Outer invol.-bracts very hairy, ovate, acuminate; inner bracts membranous, oblong, slightly longer than the outer, pubescent on the back. Ray-flowers ligulate, the ligules yellow, deeply 3-partite, the middle lobe the smallest; the upper lip obsolete; tube of the corolla hairy. Pappus of numerous slightly unequal aristate feathery bristles. Achenes $\frac{1}{12}$ in. long, oblong, densely silky-hairy,

black. Fl. B. I. v. 3, p. 311; C. B. Clarke, Comp. Ind. p. 142; Trim. Fl. Ceyl. v. 3, p. 42; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650.—Flowers more or less throughout the year.

A native of Central America. It has become completely naturalized in the Bombay Presidency, especially in the Deccan, where it is very abundant.

38. **CENTIPEDA,** Lour.

Annual or perennial herbs. Leaves alternate, often spathulate, entire or coarsely toothed. Heads small, sessile on the branches or racemose, heterogamous, disciform, yellow; outer flowers ♀, many-seriate, fertile; disk-flowers ☿, few, fertile. Involucre hemispheric; bracts 2-seriate, subequal and with scarious margins. Receptacle flat or slightly convex, naked. Corollas all regular, tubular; tube very short; limb in ♀ flowers narrow, 2–3-lobed, in the ☿ flowers broader, campanulate, 4-fid. Anther-bases obtuse, entire. Style-arms of ☿ flowers short, truncate. Pappus 0. Achenes 4-angled; tip obtuse; angles hairy.—Distrib. Asia, Australia, and Tropical S. America; species 3.

1. **Centipeda orbicularis,** *Lour. Fl. Cochinch.* (1790) p. 493. A small annual; stems numerous, 4–8 in. long, spreading from the root, prostrate, slender, leafy, usually glabrous. Leaves numerous, subsessile, $\frac{1}{4}$–$\frac{3}{8}$ by $\frac{1}{8}$–$\frac{3}{16}$ in., oblong-spathulate, with few teeth (usually 2 on each side), base tapering. Heads $\frac{1}{10}$–$\frac{1}{6}$ in. in diam., globose, solitary, axillary, subsessile. Invol.-bracts (in flower) small, oblong, obtuse, with membranous margins. Pappus 0. Achenes minute, 4-angled, bristly on the angles. Fl. B. I. v. 3, p. 317; C. B. Clarke, Comp. Ind. p. 151; Trim. Fl. Ceyl. v. 3, p. 42. *Myrogyne minuta*, Less. in DC. Prodr. v. 6, p. 139. *Dichrocephala Schmidii*, Wight, Icon. t. 1610.—Flowers: Dec.–Feb.

S. M. Country: Londa, *Raoji*! Kanara: Gonje, *Ritchie*, 1184!; Kála naddi, *Ritchie*, 1184!—Distrib. Throughout India in moist places; Ceylon, Afghanistan, Malaya, China, Australia, and the Pacific Islands.

39. **ARTEMISIA,** Linn.

Herbs or shrubs usually strongly scented. Leaves alternate, entire, incised or 1–3-pinnatisect. Heads small, solitary or fascicled, racemose or panicled, never corymbose, heterogamous with the outer flowers ♀, fertile, 1-seriate, or homogamous, the ♀ flowers wanting; inner or disk-flowers ☿, fertile or sterile. Involucre ovoid or broadly campanulate; bracts few-seriate with scarious margins, the outer shorter. Receptacle flat, convex or hemispheric, naked or hirsute. Corollas of ♀ flowers slender, tubular, shortly 2–3-fid at the apex; corollas of ☿ flowers regular, tubular, the limb slightly enlarged or campanulate, 5-fid. Anther-bases obtuse, entire. Style-arms of ☿ flowers truncate, usually penicillate; tips often connate in the sterile flowers. Pappus 0. Achenes very small, ellipsoid, oblong or subobovoid, faintly striate, glabrous or pilose.—Distrib. Chiefly in N. temperate regions, a few in S. America; species about 150.

Disk-flowers sterile.	
Lower leaves sessile, simple, cuneate	1. *A. parviflora.*
Lower leaves petioled, 1–3-pinnatisect	2. *A. scoparia.*
Disk-flowers fertile.	
Outer invol.-bracts smaller than the inner	3. *A. vulgaris.*
Outer invol.-bracts larger than the inner	4. *A. pallens.*

1. **Artemisia parviflora,** *Buch.-Ham. ex Roxb. Hort. Beng.* (1814) p. 61. Shrubby, inodorous; stem obliquely ascending, paniculately branched; branches numerous, slender. Leaves 1–2 by $\frac{1}{2}$–$\frac{3}{4}$ in., sessile; the lower usually simple, cuneate, with a variously toothed or lobed apex and with some linear stipuliform segments at the base, deep green on both sides, glabrous or slightly pubescent, not hoary-tomentose; the uppermost floral leaves minute, entire. Heads pedicelled, very numerous, $\frac{1}{10}$–$\frac{1}{8}$ in. in diam., globose, in panicled racemes, drooping, greenish; outer flowers ♀, fertile; inner flowers ☿, sterile. Invol.-bracts glabrous or nearly so, ovate, acute, with scarious margins, the outer much smaller than the inner. Achenes minute, ellipsoid, smooth, brown. Fl. B. I. v. 3, p. 322; Dalz. & Gibs. p. 314; Wight, Contrib. p. 20; C. B. Clarke, Comp. Ind. p. 159; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Watt, Dict. Econ. Prod. v. 1, p. 326. *Artemisia glabrata*, DC. in Wight, Contrib. (1834) p. 20; Wight, Icon. t. 1111.—Flowers: Oct.–Dec. VERN. *Tel-Davaná.*

DECCAN: common on the eastern side of the Mahableshwar hills and on the road to Sattara, *Dalzell & Gibson*; Panchgani Ghát, abundant, *Cooke*!, *Woodrow.*—DISTRIB. Throughout the greater part of India at altitudes from 3000 to 10,000 feet.

2. **Artemisia scoparia,** *Waldst. & Kit. Descr. et Icon. Pl. Rar. Hung.* v. 1 (1802) p. 66, t. 65. Annual or biennial, 1–3 ft. high, faintly odorous; stem very slender, scarcely as thick as a quill, erect, grooved, purplish, glabrous or more or less pubescent, simple at the base, paniculately branched above; branches sometimes almost capillary, purplish. Leaves deep green; the radical ones petioled, ovate in outline, 1–3-pinnatisect, the segments linear; cauline leaves filiform. Heads $\frac{1}{12}$–$\frac{1}{10}$ in. in diam., sessile or on short capillary pedicels, secund, in slender panicled racemes; ♀ flowers in each head fertile, with very minute corollas; ☿ flowers sterile, with much larger corollas. Invol.-bracts glistening, ovate-oblong, obtuse, with broad scarious margins, the inner bracts about twice as large as the outer. Achenes very minute, ellipsoid, about $\frac{1}{60}$ in. long. Fl. B. I. v. 3, p. 323; C. B. Clarke, Comp. Ind. p. 158; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Watt, Dict. Econ. Prod. v. 1, p. 326.—Flowers: Mar. VERN. *Gájará.*

Rare. SIND: *Dalzell*!; Mulir, *Woodrow.*—DISTRIB. India (Upper Gangetic plain, Panjáb, W. Himalaya); Japan, Afghanistan, Central Europe.

3. **Artemisia vulgaris,** *Linn. Sp. Pl.* (1753) p. 848. Perennial, shrubby, aromatic, 2–8 ft. high, pubescent or villous; stems leafy, paniculately branched. Lower leaves 2–4 by 1–2 in., petioled, ovate in outline, with stipule-like lobes at the base, deeply pinnatisect, the lobes entire, toothed or again pinnatisect, all finely pubescent above, white-tomentose beneath. Upper leaves smaller, 3-fid or entire, lanceolate. Heads $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovoid or subglobose, solitary or 2 or 3 together, sessile or very shortly pedicelled, subsecund, in spicate suberect or horizontal panicled racemes; outer flowers ♀, very slender; inner ☿, fertile. Invol.-bracts villous and with scarious margins; the outer ovate, acute; the inner oblong, obtuse, much larger than the outer, sometimes almost wholly membranous. Achenes oblong-ellipsoid, minute. Fl. B. I. v. 3, p. 325 (exclud. syn. *A. paniculata*, Roxb.); C. B. Clarke, Comp. Ind. p. 161; Trim. Fl. Ceyl. v. 3, p. 43; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Watt, Dict. Econ.

Prod. v. 1, p. 327. *Artemisia indica*, Willd. Sp. Pl. v. 3, p. 1846; Grah. Cat. p. 102; Dalz. & Gibs. p. 129; Wight, Icon. t. 1112.—Flowers: Sept.–Jan. VERN. *Dhor-davaná.*

DECCAN: Purandhar Fort, abundant, *Graham*; Ghâts, *Law*!; Panchgani, *Cooke*!; Mahableshwar hills, *Dalzell*!; along the Railway line between Talegaon and Shelarvadi Stations, G. I. P. Railway, *Bhiva*! S. M. COUNTRY: Belgaum, *Ritchie*, 1813!—DISTRIB. Throughout the hilly districts of India; Ceylon, temperate Europe and Asia, Siam, Java.

A plant having tonic and stomachic properties and used as a febrifuge. It is known as the *Indian Wormwood* and is often employed to prevent moths from infesting clothes. See Watt, Dict. Econ. Prod. l. c.

4. **Artemisia pallens,** *Wall. Cat.* (1828) 3302. Herbaceous, ½–1 ft. high, erect, branched, woolly-canescent, very aromatic; stem rather thick. Lower and middle stem-leaves orbicular in outline, 2-pinnatisect, ¾–1¼ in. long and broad with a petiole ⅔ in. long, pinnæ 3 pairs, ultimate segments linear, obtuse; upper leaves gradually smaller, less cut and with shorter petioles or sessile; the uppermost leaves oblong or subspathulate, toothed or entire. Heads globose, ⅙–⅓ in. in diam., in lax compound racemes or leafy panicles, shortly pedicelled. Involucre-bracts 15-20, the exterior oblong, obtuse, concave, rather thick, herbaceous, with a hyaline and slightly ciliate margin, the intermediate broad, cucullate, scarcely or a little shorter than the exterior, veined and with a broader hyaline margin; the innermost smaller, much thinner. Receptacle naked. Outer flowers ♀, about ⅛ in. long; disk-flowers ☿, subcampanulate, a little shorter than the outer flowers, all fertile, glabrous. Style-arms of ☿ flowers truncate, fimbriate. Achenes $\frac{1}{25}$ in. long, oblong, glabrous. Fl. B. I. v. 3, p. 329 (under doubtful species); C. B. Clarke, Comp. Ind. p. 163; Stapf, in Hook. Icon. Pl. v. 26 (1899) t. 2597; DC. in Wight, Contrib. p. 20; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650. *Artemisia paniculata*, Roxb. Hort. Beng. p. 61; Fl. Ind. v. 3, p. 418; Icones Roxburghianæ ined. in Herb. Kew. no. 1640 (*not* of Lamk.).—Flowers: Mar.–Apr. VERN. *Davaná.*

Cultivated at Alandi and Jejuri in the Deccan for use as an offering at the Rám Navami festival. The specimens from which the figure in Hook. Icon. was taken were sent to Kew from Alandi by Mr. Woodrow. There seems to be no evidence as to where the plant is to be found in a wild state. Roxburgh, Fl. Ind. l. c., mentions his having grown the plant in the Botanic Gardens, Calcutta, but states that he has not been able to ascertain its native country.

40. **GYNURA,** Cass.

Succulent herbs, rarely undershrubs, glabrous or hispid. Leaves alternate, entire, toothed or pinnatisect. Heads solitary or corymbose, bracteolate at the base, homogamous, disciform; flowers all ☿, fertile, or rarely a few of the outer flowers ♀. Involucre cylindric or subcampanulate; bracts 1-seriate, narrow, equal, sometimes cohering for a considerable distance, with scarious margins. Receptacle flat, pitted or shortly fimbrillate. Corollas regular, slender, tubular; limb slightly enlarged, very shortly 5-fid. Anther-bases entire or subauricled. Style-arms slender; tips long, subulate, hispid. Pappus-hairs copious, ∞-seriate, slender, white. Achenes narrow, many-ribbed.—DISTRIB. Warm regions of Asia, Africa, and Australia; species about 20.

1. **Gynura angulosa,** *DC. Prodr.* v. 6 (1837) p. 298. Robust, glabrous, 3–10 ft. high, more or less corymbosely branched at top; stem as thick as the little finger, angled and grooved, glabrous. Leaves variable, 4–8 by 1½–3½ in.; the upper leaves sessile, oblong or obovate, coarsely sinuate-toothed, auricled at the base; the lower leaves often lanceolate and attenuated at the base. Flowers deep orange; heads corymbose, numerous, ⅔–1 in. long, with a few linear acute bracteoles beneath the involucre; peduncles glabrous or nearly so. Invol.-bracts ½–⅝ in. long, linear, striate, and with scarious margins, glabrous. Pappus copious, white, longer than the bracts, but shorter than the corollas. Achenes deeply ribbed, oblong, narrow, quite glabrous, sometimes papillose between the ribs. Fl. B. I. v. 3, p. 334; C. B. Clarke, Comp. Ind. p. 170. *Gynura simplex*, Dalz. & Gibs. p. 130. *Gynura nitida*, Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650 (*not* of DC.).—Flowers: Aug.–Oct.

Konkan: *Stocks*!; Neral, *Bhiva*! Deccan: highest hills round Junnar, *Dalzell & Gibson*; Panchgani, *Cooke*!; Mahableshwar, *Cooke*!; Fitzgerald Ghát, *Cooke*!; hills W. of Poona, *Woodrow*!; Sinhagad, *Woodrow*!; Lanoli, *Woodrow*!; Purandhar, *Dr. Barnes*! S. M. Country: Belgaum, *Ritchie*, 1093!—Distrib. India (temperate Himalaya, Khasia Mountains, hills of the W. Peninsula).

41. **EMILIA,** Cass.

Annual or perennial often glaucous herbs, glabrous or hairy. Leaves variable; radical leaves crowded at the base of the stem, petiolate, entire, toothed or pinnatifid; cauline leaves few, alternate, usually amplexicaul and auricled. Heads on long peduncles, solitary or laxly corymbose, without bracteoles at the base, homogamous, discoid; flowers all ♀, fertile, purple or red. Involucre cylindric; bracts 1-seriate, equal, free or more or less cohering, striate. Receptacle flat, naked. Corollas tubular; limb elongate, cylindric, shortly 5-fid. Anther-bases obtuse, subentire. Style-arms subterete, ending in a short obtuse or elongate acute appendage. Pappus-hairs copious, white, soft, very slender. Achenes subterete, or angled and 5-ribbed, glabrous or scabrid on the angles.—Distrib. East Indies and Tropical Africa; species 4 or 5.

1. **Emilia sonchifolia,** *DC. in Wight, Contrib.* (1834) p. 24. A glabrous scabrid or puberulous slender herb, 1–1½ ft. high, erect or diffuse, variously branched, sometimes decumbent and rooting near the base. Leaves very variable; the lower petioled, lyrate or obovate, toothed or entire; the cauline more or less amplexicaul and auricled, usually acute, less commonly obtuse at the apex. Heads few, reaching ½ in. long, laxly corymbose, without bracteoles beneath the head; flowers purplish; peduncles very slender, nodding when young, glabrous. Involucre cylindric, glabrous or puberulous towards the top; bracts almost equalling the corollas, linear-oblong, acute, with scarious margins. Style-arms ½-cylindric; tips conic. Pappus copious, white, soft, nearly equalling the invol.-bracts. Achenes ⅛ in. long, narrowly oblong, 5-ribbed, brown, scabrid on the ribs. Fl. B. I. v. 3, p. 336; C. B. Clarke, Comp. Ind. p. 174; Trim. Fl. Ceyl. v. 3, p. 45; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650. *Caculia sonchifolia*, Linn. Sp.

Pl. (1753) p. 835; Grah. Cat. p. 98.—Flowers: Sept. VERN. *Sadamandi.*

KONKAN: *Law*! DECCAN: Poona, *Woodrow*! S. M. COUNTRY: Castlerock, *Cooke*!; Belgaum, common, *Ritchie*, 366!—DISTRIB. Throughout India; Ceylon, most tropical and subtropical regions.

Emilia flammea, Cass. Dict. Sc. Nat. v. 14, p. 406. A small plant with showy scarlet flowers and invol.-bracts much shorter than the flowers, often grown in gardens but not indigenous. It is a native of Tropical Africa. Fl. B. I. v. 3, p. 336. *Emilia sagittata*, DC. Prodr. v. 6, p. 302; Dalz. & Gibs. Suppl. p. 46.

42. **NOTONIA,** DC.

Fleshy glabrous undershrubs. Leaves alternate, obovate or lanceolate, quite entire or crenulate, fleshy. Heads large, on large peduncles, subcorymbose, homogamous, discoid, bracteolate or not; flowers all ☿, fertile, yellow. Involucre cylindric; bracts 1-seriate, equal. Receptacle flat, naked or scarcely fimbrillate. Corollas regular, tubular, slender; limb elongate, cylindric, shortly 5-fid. Anther-bases entire. Style-arms elongate; tips short, ovoid, thick, papillose. Pappus-hairs copious, slender. Achenes glabrous, subterete, 10-striate.—DISTRIB. India; Ceylon; species 3 or 4.

1. **Notonia grandiflora,** *DC. in Wight, Contrib.* (1834) p. 24. A semi-shrubby glabrous perennial 2–5 ft. high; stems stout, fleshy, not much branched, marked with the scars of fallen leaves. Leaves 2½–5 by 1–3 in., sessile or shortly petioled, obovate or elliptic-lanceolate, quite entire, very fleshy, pale glaucous-green (especially beneath). Heads ¾–1¼ in. long, corymbose, few- or many-flowered, pale-yellow; peduncles 4–12 in. long, stout, glabrous, furnished with a few small scattered leafy bracts. Invol.-bracts ½–¾ in. long, equal, linear-oblong, acute, striate and with scarious margins. Pappus-hairs copious, longer than the involucre but shorter than the corollas. Achenes ¼ in. long, oblong, 10-striate, glabrous. Fl. B. I. v. 3, p. 337; Dalz. & Gibs. p. 132; C. B. Clarke, Comp. Ind. p. 176; Trim. Fl. Ceyl. v. 3, p. 47; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Watt, Dict. Econ. Prod. v. 5, p. 430. *Notonia corymbosa*, DC. Prodr. v. 6 (1837) p. 442. *Notonia balsamica*, Dalz. & Gibs. Bo. Fl. (1861) p. 133.—Flowers: Sept. VERN. *Vándar-roti.*

I cannot find that the pappus of Dalzell's *Notonia balsamica* differs from that of *N. grandiflora.*

KONKAN: *Lambert*! DECCAN: Kamatki Ghát, *H. M. Birdwood, Cooke*!; Kartriz Ghát, *Woodrow*!; Malhargad (Poona districts), *Woodrow*!; Panchgani, *Cooke*!—DISTRIB. India (hilly districts of the W. Peninsula); Ceylon.

43. **SENECIO,** Linn.

Herbs, shrubs, or undershrubs. Leaves alternate or radical, entire or variously divided. Heads solitary, corymbose or racemose, heterogamous (rarely homogamous), usually yellow; ray-flowers fertile, ♀, or 0; disk-flowers ☿, fertile. Involucre various; bracts 1- or sub-2-seriate, equal, erect, free or connate at the base, usually keeled or

3-nerved on the back, with sometimes few or several small bracteoles below the involucre. Receptacle flat or convex, naked, pitted or fimbrillate. Corollas of ♀ flowers ligulate, the ligules elongate, spreading, or very small and revolute, or scarcely conspicuous; corollas of ☿ flowers regular, tubular, 5-fid. Anther-bases obtuse, or auricled, or minutely tailed. Style-arms of ☿ flowers recurved; tips truncate, penicillate, rarely rounded or with a short narrow point. Pappus-hairs copious or sparse, soft, usually white, smooth, scabrid or barbellate. Achenes subterete or the outer dorsally compressed, 5–10-ribbed.—DISTRIB. Chiefly in temperate climates and in mountains of the Tropics; species about 900.

Leaves not clothed beneath with white or grey cottony tomentum.	
Leaves pinnatifid; ligules 6–10	1. *S. tenuifolius.*
Leaves oblong-obovate; ligules 3	2. *S. hewrensis.*
Leaves clothed beneath with white or grey cottony tomentum.	
Heads bracteolate.	
Pappus-hairs slender.	
Suffruticose; leaves rhomboid or ovate	3. *S. Edgeworthii.*
Herbaceous; leaves linear-oblong	4. *S. Dalzellii.*
Pappus paleaceous	5. *S. Grahami.*
Heads ebracteolate.	
Pappus slender, not paleaceous; achenes glabrous	6. *S. Gibsoni.*
Pappus 0; achenes hairy	7. *S. belgaumensis.*

1. **Senecio tenuifolius,** *Burm. Fl. Ind.* (1768) t. 60, f. 4. Annual, slender, herbaceous, 6–18 in. high, usually much branched, glabrous. Leaves sessile, pinnatifid or sub-2-pinnatifid; segments slender, spreading, obtuse. Heads $\frac{1}{4}$–$\frac{5}{16}$ in. in diam., few, in divaricating corymbs, rayed; peduncles slender, glabrous, furnished with a few scattered acute bracts. Invol.-bracts 10–13, oblanceolate, subequal, $\frac{1}{8}$–$\frac{1}{6}$ in. long, acute or acuminate, with broad scarious margins and yellowish nerves, glabrous or nearly so. Ligules 6–10. Pappus copious, yellowish, as long as the achenes. Achenes of the ray-flowers usually abortive, elongate, finely pubescent or glabrous, those of the disk-flowers narrowed at the base, $\frac{1}{8}$ in. long, faintly ribbed, hairy with white hairs on the ribs, brown. Fl. B. I. v. 3, p. 345; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Watt, Dict. Econ. Prodr. v. 6, part 2, p. 501. *Senecio multifidus,* Willd. Sp. Pl. v. 3 (1800) p. 1986; C. B. Clarke, Comp. Ind. p. 198. *Doronicum tenuifolium,* Wight, Icon. t. 1129.—Flowers: Sept.–Oct.

S. M. COUNTRY: Badami, *Cooke!, Woodrow*; Belgaum hills, *Ritchie,* 388!—DISTRIB. India (W. Peninsula); Java.

2. **Senecio hewrensis,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 346. A small herbaceous annual 3–12 in. high. Lower leaves 1–1$\frac{1}{4}$ by $\frac{1}{4}$–$\frac{1}{2}$ in., oblong or somewhat obovate, subobtuse, petioled, coarsely toothed or pinnatisect, more or less hairy and ciliate; cauline leaves narrower, linear, acute or subobtuse, sessile or nearly so, auricled at the base, more or less hairy. Heads in lax corymbose cymes, yellow; peduncles capillary, long. Invol.-bracts about 10, linear-oblong or somewhat oblanceolate, acuminate, $\frac{1}{8}$–$\frac{1}{6}$ in. long, pubescent. Corollas yellow; ligules 3 in each head, broadly spathulate, short, veined. Pappus as long as the achenes, copious, pale-yellowish. Achenes $\frac{1}{10}$–$\frac{1}{8}$ in. long,

slightly tapering downwards, obscurely ribbed, hairy. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650. *Doronicum hewrense*, Dalz. in Dalz. & Gibs. Bo. Fl. p. 130.—Flowers: Sept.

Rare. DECCAN: hills near Junnar, *Dalzell & Gibson*, *Woodrow*!, *Kanitkar*!
This small plant is tolerably abundant on the hills near Junnar (Poona districts), but does not appear to have been found elsewhere.

3. **Senecio Edgeworthii,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 346. Suffruticose, erect; stem and branches terete or obtusely angled, at first woolly-pubescent, at length glabrous. Leaves petioled, 1–1¾ by 1–1⅜ in., cordate or rhomboid, or ovate, obtuse or subacute, upper surface rough, the lower clothed with white cottony pubescence, the margins sinuate-dentate; nerves prominent beneath; petioles ¼–⅜ in. long, slender, woolly, auricled at the base. Heads few or many, laxly corymbose, yellow, bracteolate; peduncles very slender, furnished with a few small scattered bracts. Involucral-bracts woolly at the base, ⅛ in. long, linear-lanceolate, acute. Ray-flowers 12–14, sterile, ligulate, the ligules linear, 4-nerved, obscurely 3-toothed at the apex. Style-branches of ♀ flowers truncate, penicillate. Pappus somewhat scanty, white, slender, slightly longer than the achenes. Achenes 1/10 in. long, oblong, slightly ribbed. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650. *Senecio tomentosus*, C. B. Clarke, Comp. Ind. p. 200 (*not* of Michaux). *Madaractis lanuginosa*, Edgew. in Trans. Linn. Soc. v. 20 (1851) p. 75. *Doronicum tomentosum*, Wight, in Calc. Journ. Nat. Hist. v. 7 (1847) p. 155; Icon. t. 1151. *Doronicum argenteum*, Dalz. MS. in Herb. Kew. —Flowers: Aug.–Nov.

DECCAN: very abundant along the Ghát road from Wai to Panchgani, *Cooke*!; Kartriz Ghát, *Woodrow*; Dongergaon near Ahmednagar, *Woodrow*.—DISTRIB. India (W. Peninsula, Central India).

4. **Senecio Dalzellii,** *C. B. Clarke, Comp. Ind.* (1876) p. 201. Herbaceous, erect, 1–3 ft. high, branched; stem and branches more or less white and cottony. Leaves coriaceous, sessile or the lower petioled, 1½–3 by ⅛–½ in., gradually becoming narrower upwards, linear-oblong or linear-lanceolate, apiculate, more or less cottony or scabrid above, densely white-woolly beneath, entire or irregularly toothed, the margins often recurved, base contracted or sometimes dilated and auricled. Heads ¼–½ in. in diam., bracteolate, dichotomously corymbose; peduncles slender, furnished with a few scattered bracts. Involucral-bracts 10–17, linear-lanceolate, acuminate, 1/10–⅛ in. long, pubescent, with or without narrow scarious margins. Ligules 8–15, narrow, about ⅛ in. long with 2 very obscure teeth at the apex, yellow. Pappus sub-2-seriate, white, rigid, a little longer than the achenes, scabrid. Achenes 1/16 in. long, scabrid with short hairs. Fl. B. I. v. 3, p. 346; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650. *S. Lawii*, C. B. Clarke, Comp. Ind. p. 201; Hook. f. Fl. B. I. v. 3, p. 347.—Flowers: Nov.–Dec.

KONKAN: *Law*!; Matheran, *Cooke*!, *Woodrow*; Suvurndrug (a small island close to the Ratnagiri coast on which an old fort stands), *Dalzell*! DECCAN: Khandala, *Cooke*!—DISTRIB. India (W. Peninsula), apparently endemic.

5. **Senecio Grahami,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 347. Herbaceous, erect, much-branched, 1–3 ft. high; stem and branches grooved and angled, glabrous or nearly so. Leaves 1–4 by ⅝–2¾ in.,

rhomboid-ovate, acute, coarsely and irregularly toothed, minutely araneo-pubescent, glabrous, or minutely scabrous above, white-tomentose between the nerves beneath, base suddenly tapering into the petiole; nerves broad, green, conspicuous, glabrous; petioles variable in length, the lower often as long as the leaf-blade, usually with lanceolate auricles at or a little above the base. Heads yellow, laxly subcorymbose, $\frac{3}{8}$–$\frac{7}{8}$ in. in diam.; bracteoles linear-subulate; peduncles elongate, slender, furnished with a few scattered linear bracts; flowers of the ray ligulate, usually sterile, the throat hairy within, ligules 10–13, sometimes (in well developed heads) reaching $\frac{1}{2}$ in. long by $\frac{1}{10}$ in. broad, the apex rounded, shortly 3-toothed. Involucral-bracts 12–24, pubescent, $\frac{1}{6}$–$\frac{1}{4}$ in. long, connate for about $\frac{2}{3}$ of the way up from the base, obovate-oblong, caudate-acuminate. Style-arms of ♀ flowers truncate, penicillate. Pappus of ray-flowers 0, of the disk-flowers slightly longer than the achenes, dilated and paleaceous at the base, setaceous above, dirty-white or yellowish. Achenes $\frac{1}{12}$ in. long, ribbed, scabrid. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650. *Senecio reticulatus*, C. B. Clarke, Comp. Ind. p. 199 (*not* of DC. v. 6, p. 431). *Doronicum reticulatum*, Wight, in Calc. Journ. Nat. Hist. v. 7 (1847) p. 156; Icon. t. 1151, B; Dalz. & Gibs. p. 130.—Flowers: Aug.–Dec. VERN. *Sonki.*

Dalzell & Gibson (Bo. Fl. p. 130) state that the achenes are without pappus, a mistake which has arisen from these authors having incompletely quoted Wight's description (Icon. t. 1151, B) from which the description in their 'Bombay Flora' has been taken. Wight says that the *ray-flowers* have no pappus, but afterwards goes on to describe the paleaceous pappus of the *disk-flowers*. Dalzell & Gibson, in quoting Wight, stopped at the end of the description of the pappus of the ray-flowers, and have therefore made it appear that the pappus is altogether wanting. (See also Hook. f. Fl. B. I. v. 3, p. 348, under *Senecio belgaumensis.*)

KONKAN: *Law!*; island of Karanja, *Dalzell & Gibson.* DECCAN: Khandala, *Cooke!*, *Woodrow!*; Mahableshwar, *Cooke!* — DISTRIB. India (W. Peninsula, Rajputana).

6. **Senecio Gibsoni,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 347. Herbaceous, erect, much-branched, 1–2 ft. high; stem and branches slender, glabrous or scaberulous, striate. Leaves sessile or petioled, ovate-lanceolate or subrhomboid, acute, apiculate, glabrous or scaberulous above, grey with appressed cottony tomentum beneath, the margins irregularly toothed or subentire; nerves prominent beneath; petioles short, auricled. Heads yellow, ebracteolate, laxly and dichotomously corymbose; peduncles slender, pubescent, with scattered linear bracts. Involucral-bracts 15–18, oblong-lanceolate or obovate, acuminate or very acute, $\frac{1}{5}$–$\frac{1}{6}$ in. long, pubescent and with scarious margins. Ligules 8–10, linear-oblong, $\frac{3}{8}$ by $\frac{1}{10}$ in., 3-toothed at the apex. Style-arms of ♀ flowers truncate, penicillate. Pappus-hairs unequal, slender, rigid, scabrid, not at all paleaceous, white or yellowish. Achenes $\frac{1}{10}$ in. long, obconic, ribbed, glabrous. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650.

Rare. KONKAN: *Law!*, *Lambert!* DECCAN: Poona, *Woodrow!*

7. **Senecio belgaumensis,** *C. B. Clarke, Comp. Ind.* (1876) p. 200. Annual, erect, herbaceous, 1–2½ ft. high, branched; stems and branches usually pubescent. Leaves 1¾–3 by ¾–2 in., petioled, rhomboid-ovate,

coarsely toothed or gashed, strigosely hairy or glabrate above, cottony-white between the nerves beneath, tapering into the petiole; nerves conspicuous green, glabrous; petioles shorter upwards, those of the upper leaves with 2 lanceolate auricles at or near the base, those of the lower leaves often without auricles. Heads corymbose, yellow, smaller than in the preceding species, usually ebracteolate; peduncles capillary with a few scattered linear bracts. Ligules usually 8, linear-oblong, $\frac{3}{8}$ in. long, 3-toothed at the apex. Invol.-bracts 12–18, hairy, $\frac{1}{8}$–$\frac{1}{6}$ in. long, linear-oblong or obovate, acuminate, with narrow scarious margins, more or less connate about $\frac{2}{3}$ of the way up, at length free. Style-arms of ♀ flowers truncate, penicillate. Pappus 0. Achenes $\frac{1}{10}$ in. long, turbinate, ribbed, hairy. Fl. B. I. v. 3, p. 348; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650. *Madacarpus belgaumensis*, Wight, in Calc. Journ. Nat. Hist. v. 7 (1847) p. 157; Icon. t. 1152; Dalz. & Gibs. p. 130.—Flowers: Aug.–Jan. VERN. *Sonki.*

Very like *Senecio Grahami* in habit and general appearance. The absence of pappus at once distinguishes it, but it may often be recognized when growing by the fewer ligules, which I find almost invariably number 8.

KONKAN: *Law*!, *Lambert*! DECCAN: Mahableshwar, *Cooke*!; Fitzgerald Ghát, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 384!, *Cooke*!, *Law*, 22! KANARA: *Law*!; Yellur Fort walls, *Ritchie*, 384!; Ainshi (N. Kanara), *Talbot*, 1371!; Kála naddi, *Ritchie*, $\frac{384}{1}$!—DISTRIB. India (W. Peninsula), apparently endemic.

Senecio sempervivus, Sch.-Bip. in Flora, v. 28 (1845) p. 500, a native of Arabia, is often grown as a pot-plant about bungalows. *Cacalia sempervirens*, Vahl, Symb. v. 3, p. 92; Dalz. & Gibs. Suppl. p. 46.

44. **ECHINOPS,** Linn.

Thistle-like herbs more or less albo-tomentose. Leaves alternate, pinnatifid, spinous. Heads in globose involucrate solitary balls, blue or white, sessile or shortly stipitate on a common receptacle, 1-flowered; flowers ☿, all fertile. Involucre oblong; bracts ∞-seriate, rigid, pungent or some spinescent, outer shorter, inner spathulate, innermost linear or lanceolate, sometimes all connate into a tube with 1 rigid spine on the outer side. Receptacle minute. Corolla regular; tube slender; limb cylindric, 5-partite with slender segments. Filaments glabrous; anther-bases sagittate, the auricles connate; tails short, fimbriate or entire. Style-arms thick and with a thick basal ring, at length more or less spreading. Pappus coroniform, of many short subpaleaceous free or more or less connate bristles. Achenes elongate, subterete or 4-gonous, villous (rarely glabrous).—DISTRIB. S. Europe, N. Africa, and Asia to Japan; species about 70.

1. **Echinops echinatus,** *Roxb. Hort. Beng.* (1814) p. 62. A much-branched rigid annual 1–3 ft. high; branches widely spreading from the base, white with cottony pubescence. Leaves sessile, 3–5 in. long, glabrous or minutely scaberulous (rarely araneously pubescent) above, white with cottony wool beneath, oblong, deeply pinnatifid, the lobes triangular and oblong, sinuate and spinescent, the spines often 1 in. long. Balls of the heads white, 1–1½ in. (rarely more) in diam. (excluding the spines); segments of corolla-limb $\frac{1}{5}$ by $\frac{1}{30}$ in., linear,

acute. Involucres surrounded by strong white bristles resembling pappus-hairs; outer invol.-bracts oblanceolate, glabrous, pungent; intermediate bracts with 1 or 2 of the bracts often produced into sharp spines sometimes exceeding 1 in. long, causing the balls frequently to bristle with many spines; innermost bracts 5–8, nearly ½ in. long, connate for more than ½ their length into a tube round the achenes, the free segments acute, or obtuse and laciniate at the apex, ciliate and with scarious margins. Anther-tails fimbriate. Pappus short, yellowish, forming a short cylindric brush above the achene. Achenes ⅛ in. long, obconic, densely villous. Fl. B. I. v. 3, p. 358; Grah. Cat. p. 95; Dalz. & Gibs. p. 131; Wight, Contrib. p. 24; C. B. Clarke, Comp. Ind. p. 211; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651.—Flowers: Nov.–Jan. VERN. *Utkatár.*

KONKAN: *Lambert*! DECCAN: common, *Graham, Woodrow*!, *Cooke*!; Poona, *Cooke*!, *Woodrow*!; Lodwick Point, Mahableshwar, *Graham*. S. M. COUNTRY: *Law* ex *Graham*. SIND: *Stocks*!—DISTRIB. More or less throughout India.

45. **GONIOCAULON,** Cass. in Bull. Soc. Philom.

An annual erect glabrous herb with an angled branched stem. Leaves alternate, narrow, toothed. Heads narrow, fascicled and corymbose, homogamous; flowers few, all ☿, fertile. Involucre oblong with narrow base; bracts ∞-seriate, imbricate, subpaleaceous, acute, erect, not spinescent, the inner elongate, the outer gradually shorter. Receptacle small, paleaceous. Corolla-tube slender; limb long, cylindric, 5-fid to the middle or lower, segments narrow. Filaments hairy; anther-bases sagittate, connate, tails short. Style-arms filiform. Pappus paleaceous, the scales ∞-seriate, very unequal. Achenes glabrous, oblong, subterete, with about 20 ribs.—DISTRIB. East Indies; species 1.

1. **Goniocaulon glabrum,** *Cass. in Dict. Sc. Nat.* v. 19 (1821) p. 201. Erect, herbaceous, 1–3½ ft. high with a straight tap-root; stem glabrous, 4–8-angled, striate between the angles. Leaves sessile, 2–5 by ⅜–1 in., ½-amplexicaul, linear-oblong or obovate-oblong, obtuse or subacute, toothed or serrate, sprinkled with black dots on both sides, base narrowed. Heads ½–⅔ in. long, narrow, with 4–6 corollas in each head, fascicled in compound corymbs with linear bracts beneath the peduncles and very short pedicels. Invol.-bracts ∞-seriate, lanceolate, acute, striate, almost white, or with colored tips. Corollas much exserted beyond the involucre, rose-colored. Pappus paleaceous, the scales very unequal, linear, slightly obovate, subobtuse. Achenes ⅕ in. long, closely ribbed, glabrous. Fl. B. I. v. 3, p. 377; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651. *Goniocaulon indicum,* C. B. Clarke, Comp. Ind. p. 236. *Amberboa indica,* DC. Prodr. v. 6, p. 558; Dalz. & Gibs. p. 131; Wight, Icon. t. 479.—Flowers: Jan.–Feb. VERN. *Kadkusumbá.*

DECCAN: *Woodrow*!, *Cooke*!; Kelgaon (Poona districts), *Bhiva*!; Uruli near Poona, *Woodrow*!; Lasalgaon, *Kanitkar*!—DISTRIB. India (Bandelkhand, Central India, W. Peninsula).

46. **TRICHOLEPIS,** DC.

Annual or perennial branched unarmed herbs. Leaves alternate, entire, toothed or the lower sublyrate, often punctate. Heads terminal, solitary, pedunculate, homogamous; flowers all ☿, fertile. Involucre ovoid or

broad; bracts ∞-seriate, imbricate, narrow, the exterior gradually shorter, all aristate-acuminate or the outer mucronate. Receptacle flat or convex, densely bristly. Corollas yellow, red, or purple, regular or slightly oblique; tube slender; limb deeply 5-fid. Filaments papillose; anther-bases sagittate, with connate auricles; tails slender, lacerate. Style-arms usually slender, elongate (short and subdeltoid in *T. amplexicaulis*). Pappus-bristles ∞-seriate, very unequal, serrulate, barbellate, or plumose, long and slender, or sometimes short and paleaceous (rarely 0). Achenes glabrous, with a very oblique or lateral areole, oblong or obovoid, smooth, faintly ribbed.—DISTRIB. East Indies; species 7.

Pappus copious.	
A divaricately branched often decumbent herb; paleæ of the receptacle not reaching above the pappus	1. *T. radicans.*
An erect glabrous herb; paleæ of the receptacle reaching above the pappus	2. *T. glaberrima.*
Pappus obsolete	3. *T. amplexicaulis.*

1. **Tricholepis radicans,** *DC. Prod.* v. 6 (1837) p. 564. A slender erect or decumbent herb divaricately branched from the base; stem and branches angled, glabrous or minutely scaberulous, leafy. Leaves sessile, 1–2 by ¼–¾ in.; lower leaves usually obovate; cauline oblong; all coarsely toothed or serrate or sometimes pinnatisect, glabrous, punctate, the teeth or serratures as well as the apex mucronate or bristle-pointed. Heads ⅜–⅔ in. in diam., more or less woolly-pubescent; peduncles solitary, erect, glabrous, angled and grooved. Corollas ⅜ in. long, purple. Invol.-bracts elliptic-lanceolate, aristate-acuminate, glabrous, the bristles long, recurved, barbellate; outer bracts green with scarious margins; innermost almost entirely scarious and with shorter bristles than the outer. Style-arms slender, with a very small ring of hairs at the base of the lobes. Paleæ of the receptacle linear, acute, shorter than the achenes, but not reaching above the pappus. Pappus yellowish, subpaleaceous, a little shorter than the achenes; the setæ flattened, very unequal, numerous, persistent. Achenes oblong, smooth, ⅕ in. long, faintly striate. Fl. B. I. v. 3, p. 381; Dalz. & Gibs. p. 131; C. B. Clarke, Comp. Ind. p. 239; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651.—Flowers: Sept.–Nov. VERN. *Dáhún.*

KONKAN: *Stocks!, Lambert!* DECCAN: Kolhapur, *Cooke!*; Dongergaon near Ahmednagar, *Cooke!*; ravines in the Deccan, common, *Dalzell & Gibson.* S. M. COUNTRY: north of Dharwar, *Ritchie,* 1098!; Belgaum, *Ritchie,* 1098! KANARA: *Law!*—DISTRIB. India (W. Peninsula).

2. **Tricholepis glaberrima,** *DC. Prodr.* v. 6 (1837) p. 564. Quite glabrous; stem erect, slender, and as well as the branches angled and ribbed. Leaves sessile, 1–2½ by ⅛–¼ in., linear-oblong or lanceolate, acute, entire, spinous-toothed or spinous-serrate, punctate, base of the cauline leaves not or rarely auricled; midrib and nerves very prominent beneath. Heads ¼–⅓ in. long, ovoid, glabrous. Corollas ½–9/16 in. long, purple. Invol.-bracts linear-lanceolate, aristate-acuminate, ciliolate, suberect or slightly recurved. Style-arms slender, with a ring of hairs at the base of the lobes. Paleæ of the receptacle reaching much above the pappus, narrowly linear, acute. Pappus shorter than the achenes, copious, yellowish-brown, rigid, subpaleaceous. Achenes oblong, faintly ribbed. Fl. B. I. v. 3, p. 381; Dalz. & Gibs. p. 131; C. B. Clarke,

Comp. Ind. p. 240; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Hoffm. in Engl. & Prantl, Pflanzenf. v. 4, part 5, p. 325, fig. 148, D; Watt, Dict. Econ. Prodr. v. 6, part 4, p. 80. *Serratula indica*, Willd. Sp. Pl. v. 3, p. 1642; Grah. Cat. p. 95.—Flowers: Dec. VERN. *Dáhán.*

KONKAN: *Law*!; Salsette, *Graham.* DECCAN: Khandala, *Cooke*!; Panchgani, *Woodrow*! S. M. COUNTRY: Erur, *Graham.* KANARA: *Thomson*!—DISTRIB. India (W. Peninsula, Central India, Márwar).

3. **Tricholepis amplexicaulis,** *C. B. Clarke, Comp. Ind.* (1876) p. 240. An erect annual 3–5 ft. high; stem stout and as well as the branches angled and ribbed, glabrous or minutely scaberulous. Leaves sessile, 3–5 by ¾–1½ in., punctate, mucronate, glabrous, distantly and irregularly spinous-toothed or serrate, the margins between the teeth often minutely denticulate, linear-oblong or obovate-oblong, base dilated, auricled, toothed, ½-amplexicaul; midrib and nerves prominent beneath. Heads ¾–1¼ in. in diam., more or less woolly-pubescent; peduncles short, stout, angular, glabrous or nearly so, furnished with leafy bracts. Corollas reaching ¾ in. long, purple, the lobes of the limb ¼ by $\frac{1}{10}$ in. Outer invol.-bracts linear-lanceolate, aristate-acuminate, with narrow scarious margins, the apical bristles very long and almost glabrous, spreading or recurved; the inner bracts much longer than the outer with shorter bristles, linear, acute, almost entirely scarious, ciliate towards the top. Style-arms short, subdeltoid, with a ring of hairs at the base of the lobes. Paleæ of the receptacle longer than the achenes but shorter than the corollas, very narrow, acute. Pappus 0 or rarely of a few hairs. Achenes ⅛–¼ in. long, obovoid, smooth, glossy, the basal areole very oblique, top rounded and with a very small apical scar, dark-brown, nearly black. Fl. B. I. v. 3, p. 381; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651.—Flowers: Nov.–Dec. VERN. *Dáhán.*

KONKAN: *Stocks*!, *Law*!, *Dalzell*! DECCAN: Khandala, *Cooke*!, *Woodrow*! KANARA: *Law*!—DISTRIB. India (W. Peninsula).

47. VOLUTARELLA, Cass.

Erect or divaricately diffuse annuals. Leaves alternate, toothed or remotely pinnatifid. Heads heterogamous; outer flowers 1-seriate, neuter; disk-flowers ☿, fertile. Involucre ovoid or globose; bracts ∞-seriate, imbricate, the innermost narrow, acute, sometimes colored, erect, the exterior gradually shorter, acute, mucronate, or terminated by an awn or a simple spreading spine. Receptacle flat, densely bristly. Corollas regular, purple, violet, or blue; tube slender; limb cylindric, deeply 5-fid. Filaments glabrous or hairy; anther-bases sagittate, the auricles connate, shortly tailed. Style filiform, the arms free or connate. Pappus more or less paleaceous, ∞-seriate, the innermost 2–4, dilated and flattened, the outer gradually shorter. Achenes obovoid or oblong, subterete or angled, prominently and regularly 5–15-ribbed, the areole oblique or lateral.—DISTRIB. S. Europe, N. Africa, W. Asia, India; species 4 or 5.

1. **Volutarella divaricata,** *Benth. & Hook. f. Gen. Pl.* v. 2 (1873) p. 476 (exclud. syn. *Centaurea patula* and *Serratula divaricata*). Stem erect, dichotomously branched, glabrous or scaberulous; branches 1–2 ft. long, angled, smooth or scabrid. Leaves oblong or obovate, entire, toothed

or pinnatifid with mucronulate lobes, often undulate or crisped, glabrous or pubescent. Heads ovoid-oblong, ½–1 in. long by ¼–½ in. in diam., araneously pubescent; peduncles grooved, glabrous or puberulous, with a few small foliaceous bracts. Involucre-bracts elliptic-oblong with a long spreading or recurved spinescent awn. Corollas ½–¾ in. long, purple; lobes ⅛ in. long by about $\frac{1}{30}$ in. wide, linear, acute, very tender. Anther-tails connate to the tips, with a membrane between them in front of the minutely pubescent filaments. Style-arms long, slender, recurved. Paleæ of the receptacle short, about equalling or shorter than the achenes. Pappus of many unequal hairs, silvery-brown, the innermost flattened and long. Achenes ⅕ in. long, acutely angled, and, in the ripe fruit, punctate between the angles, areole small, the top broad, truncate. Fl. B. I. v. 3, p. 383; C. B. Clarke, Comp. Ind. p. 242; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Watt, Dict. Econ. Prod. v. 6, part 4, p. 297. *Tricholepis procumbens*, Wight, Icon. t. 1139; Dalz. & Gibs. p. 131. *Tricholepis Candolleana*, Wight, in Hook. Comp. Bot. Mag. v. 1 (1835) p. 81, t. 4.—Flowers: Nov. VERN. *Lih-katmanda.*

KONKAN: *Law*!, *Lambert*! DECCAN: near Wadi, *Cooke*! GUJARAT: common in light soils, *Dalzell & Gibson*; Broach (dry places), *Kanitkar*! SIND: *Dalzell*!; Karachi to Mugger Peer, *Perry*!; Mulir, *Woodrow*!, *Cooke*!; Jemadar ka Landa near Karachi, *Stocks*, 1192!—DISTRIB. Central, Western, and Southern India; Afghanistan, Beluchistan.

48. **DICOMA,** Cass.

Herbs or low shrubs. Leaves alternate. Heads subsessile on the branches or in the axils of the upper leaves, or leaf-opposed, rarely corymbose, homogamous, discoid, all the flowers ☿; or heterogamous, the outer flowers being ♀, all fertile or the innermost sterile. Involucre globose, conic or subcampanulate; bracts ∞-seriate, imbricate, ovate, lanceolate or linear, acuminate, spinescent or mucronate or with a long apical spine, the outer bracts gradually shorter. Receptacle flat, naked, often pitted. Corollas of ☿ flowers tubular, the limb enlarged, 5-partite, with erect or revolute lobes; corollas of ♀ flowers, if present, slender, subligulate. Anther-bases sagittate; tails long, more or less bearded. Style-arms short, erect, obtuse. Pappus-hairs ∞-seriate, the inner or all flat, barbellate or feathery, the outer shorter, paleaceous or of slender bristles. Achenes turbinate, densely silky-villous, 5–10-ribbed.—DISTRIB. Tropical and S. Africa; 1 species widely spread throughout India; species 13.

1. **Dicoma tomentosa,** *Cass. in Bull. Soc. Philom.* (1818) p. 47. Annual, erect, much-branched, 6–18 in. high; stem woody at the base and as well as the branches terete, clothed with white cottony wool, the older branches often tinged with purple. Leaves sessile, 1–2½ by ⅛–⅜ in., linear or linear-obovate, obtuse or subacute, apiculate, entire, clothed on both sides with cottony wool. Heads numerous, campanulate, subsessile or shortly peduncled, solitary, axillary, leaf-opposed and terminal. Corolla white or pale-yellow, ¼ in. long; segments of the limb ⅙ in. long. Involucre-bracts ½–⅔ in. long, linear-lanceolate, membranous, glabrous, terminated by a long spine. Pappus longer than the achenes, the outer bristles slender, slightly shorter than the inner, the inner ⅓ in. long, paleaceous, lanceolate-subulate, strongly nerved and with a rigid midrib. Achenes ⅛ in. long, $\frac{1}{12}$ in. broad, turbinate, truncate at top, densely

clothed with long silky hairs. Fl. B. I. v. 3, p. 387; C. B. Clarke, Comp. Ind. p. 245; Aitch. Pb. & Sind Pl. p. 81; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Watt, Dict. Econ. Prod. v. 3, p. 111. *Dicoma lanuginosa*, DC. in Wight, Contrib. (1834) p. 26; Icon. t. 1140; Dalz. & Gibs. p. 132.—Flowers: Nov.-Mar. VERN. *Navanangi*.

DECCAN: hills near Alandi, *Kanitkar*!; Gokak Falls, *Ritchie*, 1803! S. M. COUNTRY: Badami, *Cooke*! GUJARAT: near Gogo (Kathiawar), *Dalzell & Gibson*; Junaghad (Kathiawar), *Cooke*! SIND: *Stocks*!; Tata, *Woodrow*!, *Bhola Puran*!—DISTRIB. India (N.W. Provinces, W. Peninsula); Tropical Africa.

The plant has been used medicinally in Belgaum as an agreeable bitter and febrifuge. See Watt, Dict. Econ. Prod. l. c.

49. **HOCHSTETTERIA,** DC.

A rigid branched perennial herb. Leaves alternate, usually denticulate. Heads solitary, terminal, homogamous, discoid; flowers orange, all ☿, fertile. Involucre hemispheric; bracts ∞-seriate, narrow, very acute, rigid, with scarious margins, the outer shorter. Receptacle convex, pitted, the margins of the pits often produced into short paleæ. Corollas regular, tubular; limbs elongate, 5-partite, the lobes more or less revolute. Anther-bases subciliate, the auricles produced into long lanceolate subciliate tails. Style-arms linear, obtuse, flattened. Pappus of 10 stellately spreading paleæ with hyaline margins below the middle, slender and barbellate above.—DISTRIB. Tropical Africa, Arabia, Sind; species 1.

1. **Hochstetteria Schimperi,** *DC. Prodr.* v. 7 (1838) p. 287. An erect, much-branched, rather rigid herb 1–2 ft. high; branches slender, erect or ascending, angular, glabrous or pubescent. Leaves (including the petiole) ¾–2 by ¼–¾ in., elliptic-oblong, subobtuse, mucronate, serrulate, araneously-pubescent on both sides, attenuated at the base into a short obscurely winged petiole. Heads ½–¾ in. in diam., usually with foliaceous bracts at the base which are shorter than the involucre. Involucre-bracts linear-lanceolate, aristate, the outer very short, the innermost reaching ½ in. long, pubescent, with a strong midrib and scarious and ciliolate margins. Receptacle convex, deeply pitted, the pits with toothed paleaceous margins. Corolla ¼ in. long; lobes linear-lanceolate, ⅙ in. long. Pappus much longer than the achenes, slightly shorter than the corolla; hairs 10, rigid, with a hyaline wing at each side at the base, barbellate above. Achenes turbinate, $\frac{1}{10}$ in. long, densely villous with long brownish hairs which cover the achene. Fl. B. I. v. 3, p. 388; C. B. Clarke, Comp. Ind. p. 246; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651.—Flowers; Jan.

In India confined to Sind. SIND: *Bhola Puran*!, *Woodrow*; sandstone rocks near Shah Bilawah, *Dalzell*!—DISTRIB. Nubia, Arabia (tolerably abundant at Aden).

50. **LACTUCA,** Linn.

Glabrous (rarely hispid) usually milky herbs. Leaves radical and alternate, entire, coarsely toothed or pinnatifid, the margins setoso-ciliate or naked; cauline leaves often amplexicaul and auricled. Heads variously paniculate, sessile or pedunculate, homogamous; flowers all ligulate, yellow, purple or blue. Involucre cylindric, usually narrow; bracts usually few-seriate, often with scarious margins; the innermost

elongate, subequal, the outer often very short. Receptacle flat, naked. Corollas ligulate, truncate and 5-toothed at the apex. Anther-bases sagittate, with acute or shortly setaceo-acuminate auricles (rarely prolonged into lacerate tails). Pappus copious; hairs ∞-seriate, very slender, simple, persistent or separately deciduous. Achenes ovoid, oblong or narrow, more or less compressed, sometimes flattened, shortly contracted at the base, abruptly or gradually produced into a beak at the apex; faces 3–5-ribbed, the ribs slender or strong, smooth or rarely transversely rugose; beak slender or short and cylindric, more or less dilated into an entire or toothed pappiferous disk.—DISTRIB. Europe, Asia, Africa, and N. America; species about 60.

A stout herb 2–5 ft. high; leaves sometimes 12 in. long..... 1. *L. runcinata.*
A slender herb 8–18 in. high; leaves rarely exceeding 4 in. long. 2. *L. remotiflora.*

1. **Lactuca runcinata,** *DC. in Wight, Contrib.* (1834) p. 26. A tall glabrous herb 2–5 ft. high; stem, erect, cylindric, hollow below, often very stout and much-branched. Leaves sessile, mostly radical, runcinate or pinnatifid, membranous, glabrous on both sides, with spinoso-ciliate often inciso-serrate margins; radical leaves 4–12 in. long, obovate, obtuse, narrowed at the base; cauline leaves few, remote, narrower, ½-amplexicaul, auricled. Heads ½ in. long, cylindric, usually sessile, solitary or in small distant clusters along slender leafless branches; flowers pinkish-white. Outer invol.-bracts few, $\frac{1}{16}$–$\frac{1}{8}$ in. long, ovate, acute, with broad scarious margins; inner bracts ⅓ in. long, linear-oblong, subobtuse, with scarious margins. Ligules narrow, shortly and bluntly 5-toothed at the apex. Anther-bases shortly setaceo-acuminate. Style-arms slender. Pappus white, soft, slender, longer than the achenes, copious. Achenes $\frac{1}{10}$–$\frac{1}{8}$ in. long, compressed, faintly ribbed, muriculate, black, tapering into a beak which is suddenly dilated into a whitish cup-like disk beneath the pappus. *Lactuca Heyneana,* DC. Prodr. v. 7 (1838) p. 140; Hook. f. Fl. B. I. v. 3, p. 403; C. B. Clarke, Comp. Ind. p. 261 (exclud. syn. *Prenanthes sarmentosa*); Trim. Fl. Ceyl. v. 3, p. 52; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651. *Brachyramphus Heyneanus,* Wight, Icon. t. 1146; Dalz. & Gibs. p. 132. —Flowers: Dec. VERN. *Páthari.*

The name *L. runcinata* is 4 years prior to that of *L. Heyneana* and by the same author.

Common on old walls, *Dalzell & Gibson.* DECCAN: widely, *Woodrow.*—DISTRIB. India (N. Western Provinces, W. Peninsula); Ceylon.

2. **Lactuca remotiflora,** *DC. in Wight, Contrib.* (1834) p. 26. Herbaceous, 8–18 in. high; stem slender, branched. Leaves mostly radical, sessile, 2–4 by 1–1½ in., obovate or oblong-pinnatifid, rounded at the apex, finely sinuate-toothed, glabrous. Heads usually solitary (rarely fascicled) along the naked slender branches, with peduncles nearly as long as the head. Invol.-bracts, flowers, pappus and achenes as in *Lactuca runcinata,* but the achenes rather longer than in that plant. Fl. B. I. v. 3, p. 403; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Watt, Dict. Econ. Prod. v. 4, p. 578. *Brachyramphus sonchifolius,* DC. Prod. v. 7 (1838) p. 177; Dalz. & Gibs. p. 132.—Flowers: Sept. VERN. *Páthari.*

DECCAN: Poona, *Woodrow*!; Kirki, *Woodrow*! S. M. COUNTRY: Badami, *Woodrow*. SIND: *Dalzell*, 48!; Jemadar ka Landa near Karachi, *Stocks*, 1190!—DISTRIB. North Western Provinces of India; Arabia.

Lactuca Scariola, Linn. Sp. Pl. ed. 2, p. 1119. VAR. *sativa*.—The *Garden Lettuce*, cultivated widely throughout the Bombay Presidency and generally throughout India. A very excellent variety which Woodrow has named the *Poona Brown Cos* was introduced into Poona more than 40 years ago, and has become a favorite with market gardeners. It is a large lettuce of the true Cos form and black-seeded, the leaves are a rich brown outside, greenish-white inside, tender, crisp, and of good flavor. The seed is procurable from any Poona seed-merchant. Fl. B. I. v. 3, p. 404; Grah. Cat. p. 94; Dalz. & Gibs. Suppl. p. 45; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Gard. in Ind. ed. 5, p. 361; Watt, Dict. Econ. Prod. v. 4, p. 578.

51. **SONCHUS,** Linn.

Annual or perennial herbs with milky juice. Leaves radical or alternate, the cauline often amplexicaul and auricled, entire, toothed or pinnatifid, the margins sometimes rigidly ciliolate or subspinous. Heads terminal, irregularly subcorymbose, umbellate or paniculate, rarely solitary, yellow, homogamous. Involucre ovoid, campanulate, or cylindric, often dilated, thickened or conic at the base; bracts ∞-seriate, imbricate, herbaceous, the outer smaller. Receptacle flat, naked. Corollas all ligulate, truncate and 5-toothed at the apex. Anther-bases sagittate, the auricles shortly setaceo-acuminate. Style-branches slender. Pappus copious; hairs ∞-seriate, very slender, simple, usually pure white, united at the base into a deciduous ring. Achenes ovoid, obovoid, or ellipsoid, more or less compressed, ribbed, slightly contracted at the base and apex (but not beaked), glabrous, smooth or transversely rugose.—DISTRIB. Europe, Asia, Africa, and Australasia; a few species spread over the globe; species about 24.

Auricles of the cauline leaves acute, spreading	1. *S. oleraceus.*
Auricles of the cauline leaves obtuse, appressed.	
Involucr.-bracts glabrous; achenes much compressed, not transversely rugose	2. *S. asper.*
Involucr.-bracts glandular-hairy; achenes scarcely compressed, transversely rugose	3. *S. arvensis.*

1. **Sonchus oleraceus,** *Linn. Sp. Pl.* (1753) p. 794. A coarse erect annual 1½–3 ft. high; stem glaucescent, striate, branched above. Cauline leaves sessile, oblong or obovate, entire or runcinate-pinnatifid, ½-amplexicaul, with spreading acute auricles, dentate, glabrous. Heads in irregular umbellate cymes, campanulate, ½–⅝ in. long, many-flowered; flowers yellow; pedicels often glandular. Involucr.-bracts glabrous or nearly so; outer bracts shorter than the inner, which reach ½ in. long. Pappus copious, pure white, longer than the achenes. Achenes ⅛ in. long, compressed, narrowly obovoid, longitudinally ribbed, distinctly transversely muriculate, light-brown. Fl. B. I. v. 3, p. 414; Grah. Cat. p. 94; Syme, Eng. Bot. ed. 3, v. 5, p. 153; C. B. Clarke, Comp. Ind. p. 275; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Watt,

Dict. Econ. Prod. v. 6, part 3, p. 275. *Sonchus ciliatus*, Lam. Fl. Fr. v. 2 (1778) p. 87; Wight, Icon. t. 1141.—Flowers: Sept.–Feb. VERN. *Mhatara.*

Probably an introduction. In Graham's Catalogue of Bombay plants the plant is mentioned as occurring in Deccan gardens, but it has since spread itself tolerably widely throughout that Province. KONKAN: Matheran, *Cooke*! DECCAN: *Woodrow*; Bijapur, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 367! GUJARAT: Surat, *Nimmo* ex *Graham*. SIND: Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. Throughout India sparingly; all temperate and many tropical countries, wild or introduced.

2. **Sonchus asper,** *Hill, Herb. Brit.* v. 1 (1769) p. 47. Annual, glabrous or sparsely glabrous above; stem branched. Leaves sessile, slightly rugose; the cauline elliptic-oblong entire, or runcinate or pinnatifid, ½-amplexicaul with rounded appressed auricles, undulate, spinous-dentate or simply dentate. Heads crowded in an irregular umbel; flowers yellow. Invol.-bracts glabrous. Pappus copious, very slender, white. Achenes ⅛ in. long, much compressed, elliptic in outline, longitudinally striate by fine distant ribs, not transversely muriculate. Fl. B. I. v. 3, p. 414; Aitch. Pb. & Sind Pl. p. 82; C. B. Clarke, Comp. Ind. p. 275; Syme, Eng. Bot. ed. 3, v. 5, p. 154; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651.—Flowers: Jan.–Mar. VERN. *Mhatara.*

The plant is considered by Bentham to be a variety of *Sonchus oleraceus*, Linn., from which it differs in the achenes, which are not transversely muriculate, and in the leaf-auricles, which in *S. asper* are rounded and appressed, in *S. oleraceus* acute and spreading.

Not common, probably introduced. DECCAN: Sinhagad, *Woodrow*!; Poona, *Woodrow*. SIND: *Stocks*!—DISTRIB. Throughout India, sparingly; all temperate and many tropical countries, wild or introduced.

3. **Sonchus arvensis,** *Linn. Sp. Pl.* (1753) p. 793. A tall perennial; rootstock with long slender creeping stolons which send up small tufts of radical leaves; stems glabrous, more or less angular, 2–5 ft. high, hollow below. Leaves 6–12 in. long, green and shining above, glaucous beneath, glabrous; lower leaves narrowly oblanceolate, subacute, entire or pinnatifid or runcinate-pinnatifid; middle and upper cauline leaves lanceolate, or the uppermost linear, usually undivided, abruptly acuminate, ½-amplexicaul with short rounded appressed auricles, all more or less undulate and with spinous-dentate margins. Heads few, 1–2 in. across, umbellately corymbose; peduncles glandular-hairy; flowers bright yellow. Invol.-bracts clothed (as is often also the upper part of the stem) with long hairs tipped with greenish-yellow glands. Pappus white, silky, scarcely exceeding the invol.-bracts. Achenes scarcely compressed, longitudinally ribbed and transversely rugose. Fl. B. I. v. 3, p. 414; Syme, Eng. Bot. ed. 3, v. 5, p. 154; C. B. Clarke, Comp. Ind. p. 276; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Watt, Dict. Econ. Prod. v. 6, part 3, p. 275. *Sonchus Wightianus*, DC. Prod. v. 7 (1838) p. 187; Wight, Icon. t. 1142.—Flowers: Dec.–Jan.

Rare. DECCAN: Bijapur, *Woodrow*.

The occurrence of this plant in the Bombay Presidency is somewhat doubtful. Woodrow in his list of Bombay Plants gives it as occurring at Bijapur, but I have seen no specimens from that locality, and there are none from Bombay in Herb. Kew.—DISTRIB. Very sparingly throughout the plains of India, more common on the hills; all temperate and many tropical countries, wild or introduced.

52. **LAUNÆA,** Cass.

(MICRORHYNCHUS, Less.)

Perennial glabrous herbs usually with yellow juice. Leaves mostly radical, sinuately-lobed or pinnatifid; margins often with cartilaginous or subspinous teeth. Heads pedunculate or subsessile, solitary, fascicled, racemose or paniculate, homogamous; flowers all ligulate, yellow. Involucre campanulate or cylindric; bracts ∞-seriate, imbricate, often with scarious margins; innermost bracts subequal; the outer gradually shorter, the outermost often very short. Receptacle flat, naked. Corollas ligulate, truncate and 5-toothed at the apex. Anther-bases sagittate, with acute or shortly setaceo-acuminate auricles. Style-arms slender. Pappus copious; hairs ∞-seriate, simple, very slender, white, a few inner sometimes longer and stronger, all connate at the base into a deciduous ring. Achenes narrow, usually columnar, not contracted at the base or apex, truncate at both ends, sometimes winged, 4–5-ribbed.—DISTRIB. Europe (Mediterranean region), East Indies, Africa, and the Canary Islands; species about 20.

Achenes not winged.
- Heads terminal on the paniculately branched flowering stems. 1. *L. chondrilloides.*
- Heads more or less racemose or fascicled on the flowering stem or its branches.
  - Stems and branches not rooting at the nodes ..... 2. *L. nudicaulis.*
  - Stems and branches rooting at the nodes ..... 3. *L. pinnatifida.*

Achenes winged..... 4. *L. glomerata.*

1. **Launæa chondrilloides,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 415. Perennial, glabrous, or nearly so; stem erect, paniculately branched. Radical leaves rosulate, 3–5 in. long, narrow, runcinate-pinnatifid; lobes numerous, unequal, irregularly and acutely toothed. Cauline leaves sessile, auricled, irregularly toothed or pinnatifid. Flowering branches few or many, 6–18 in. long, stout, dichotomously branched, with small leafy bracts at the forks. Heads terminal, ½–1 in. long, cylindric or ovoid; peduncles bracteate. Invol.-bracts glabrous, 3- or 4-seriate; the outer ovate, acute, subcordate, much shorter than the inner; innermost sometimes reaching ¾ in. long, linear-lanceolate, acute, membranous, ciliolate at the apex. Pappus soft, white, longer than the achenes, the outer hairs numerous, slender, the inner hairs much longer, reaching nearly ½ in. long, rigid, and much stouter than the outer. Achenes ⅕–¼ in. long, narrowly oblong, truncate at both ends, strongly ribbed, the ribs slightly papillose. *Microrhynchus chondrilloides,* C. B. Clarke, Comp. Ind. p. 277 (*not* of Sch.-Bip.). *Sonchus Candolleanus,* Jaub. & Spach, Illust. Pl. Orient. v. 3, p. 110, t. 279; Aitch. Pb. & Sind Pl. p. 82.

Rare. SIND: *Stocks,* 715!; sandy shore near Karachi, *Dalzell,* 47!—DISTRIB. India (Panjáb); Afghanistan, Persia, Arabia, Egypt.

2. **Launæa nudicaulis,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 416. Glabrous, 6–24 in. high, branched. Leaves 2–10 by 1–3 in., mostly radical; lower leaves obovate-oblong, pinnatifid, with rounded or very obtuse segments, spinulose on the margins with white cartilaginous teeth; cauline leaves distant, few, sessile, narrowly oblong, pinnatifid. Flowering stems decumbent or spreading, irregularly branched. Heads ½–¾ in. long, cylindric, remotely subracemose along the branches, shortly

pedicelled, subsolitary or fascicled (sometimes 6–10 in a cluster), supported by leaves or naked. Involucral-bracts all with broad white membranous margins; the outer very short, ovate, acute, with a strong midrib, subcordate; the innermost thrice as long as the outer, reaching ½ in. long, linear, subacute, longer than the pappus, the midrib thickened in front. Pappus-hairs subequal, soft, white, copious. Achenes $\frac{1}{10}$–$\frac{1}{8}$ in. long, polymorphous; inner sometimes as if composed of 4 thick ribs; outer slightly curved and flattened, with a thick ventral and several thick dorsal ribs, all smooth or obscurely uneven. *Microrhynchus nudicaulis*, Less. Syn. p. 139; Aitch. Pb. & Siud Pl. p. 83. *M. fallax*, Jaub. & Spach, Ill. Pl. Orient. v. 3, p. 106, t. 276. *Lactuca obtusa*, C. B. Clarke, Comp. Ind. p. 261 (exclud. many syn.), *not* of Benth.—Flowers: Nov. VERN. *Páthari.*

S. M. COUNTRY: Belgaum, *Ritchie*, 365! KANARA: Yellur, *Ritchie*, 1802! SIND: *Ritchie*, 1801!; Jemadar ka Landa near Karachi, *Stocks*, 688!—DISTRIB. More or less throughout the plains of India; Afghanistan and westwards to the Atlantic.

3. **Launæa pinnatifida,** *Cass. in Ann. Sc. Nat.* sér. 1, v. 23 (1831) p. 85. Glabrous, flagelliform, procumbent; stems 1–3 ft. long, rooting and leaf-bearing at the nodes and arching between them. Leaves radical and springing from the nodes; the radical 1–3 in. long, oblong, runcinate-pinnatifid or sinuate-toothed or lobed, the teeth rarely white and cartilaginous. Heads ⅜–½ in. long, solitary or in clusters of 1–2, arising from the nodes together with the cauline leaves; peduncles short and with several small bracts. Involucral-bracts with white membranous margins; the outer small, oblong, subobtuse; the inner ½ in. long, linear, subacute. Pappus ¼ in. long, deciduous, the hairs subequal, soft, white. Achenes pale, ⅕ in. long, obtusely 4-gonous. Fl. B. I. v. 3, p. 416; Trim. Fl. Ceyl. v. 3, p. 52; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Watt, Dict. Econ. Prod. v. 4, p. 595. *Microrhynchus sarmentosus*, DC. Prodr. v. 7, p. 181; Wight, Ill. t. 133; Dalz. & Gibs. p. 132; C. B. Clarke, Comp. Ind. p. 277. *Prenanthes sarmentosa*, Willd. Sp. Pl. v. 3, p. 1540; Grah. Cat. p. 94.—Flowers: Dec. VERN. *Páthari.*

KONKAN: Bombay, *Graham*; Revadanda, *Kanitkar*!; Shrivardhan (sea-shore), *Woodrow*! GUJARAT: Veráwal (Kathiawar), *Woodrow*. SIND: *Cooke*!

The plant is often given in Bombay to buffaloes to promote the secretion of milk, and the juice is given as a soporific to children. See Watt, Dict. Econ. Prod. l. c.—DISTRIB. India on sandy sea-shores; Ceylon, Mauritius, Egypt, E. Africa.

4. **Launæa glomerata,** *Hook. f. Fl. B. I.* v. 3 (1881) p. 417. A glaucescent glabrous plant, with a perennial root; stems cylindric, usually numerous, 2–7 in. long, diffuse or ascending or suberect or decumbent, almost leafless. Radical leaves 3–5 by 1–1½ in., sessile, sinuately-lobed, pinnatifid or runcinate, the lobes usually rounded and with white cartilaginous teeth. Flowering branches spreading, sparingly dichotomously branched. Heads subsessile, ½–⅔ in. long, broader than in the three preceding species, campanulate, clustered at the ends of the branches; flowers yellow. Involucral-bracts with broad membranous margins; outer ovate, small; the innermost ⅜ in. long, oblong-lanceolate, acute, scarcely exceeding the pappus. Pappus ¼ in. long, deciduous; the hairs subequal, soft, white. Achenes ⅛ in. long, corky, oblong, truncate at both ends, white or pale-yellow, conspicuously winged.

Microrhynchus glomeratus, Jaub. & Spach, Ill. Pl. Orient. v. 3, p. 105, t. 275.

SIND: *Stocks*!
I have seen but one Bombay specimen collected in Sind by Stocks.—DISTRIB. India (Panjáb); Persia, Arabia, Egypt, Algiers.

A great many plants of the Order have been introduced into India, some of which have become naturalized and, in some cases, as for example *Lagasca mollis*, have become almost pests of agriculture. Several are grown for economic purposes, while a large number are cultivated in gardens as ornamental plants.

Some of the most important of the species introduced into the Presidency of Bombay are given below.

Aster Amellus, Linn. Sp. Pl. (1753) p. 873. The *Michaelmas Daisy*. Herbaceous perennial which thrives in the climate of the Deccan and is deserving of attention for the garden. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647; Gard. in Ind. ed. 5, p. 363.

Vittadinia australis, A. Rich. Ess. Fl.-Nouv. Zél. p. 251. The *Australian Daisy*, cultivated in gardens. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 647.

Eupatorium triplinerve, Vahl, Symb. v. 3, p. 97. A native of Tropical America, with slaty-blue flowers, now common in gardens. The leaves are a good bitter. *Eupatorium Ayapana*, DC. Prodr. v. 5, p. 169; Grah. Cat. p. 98; Dalz. & Gibs. Suppl. p. 47.

Brachycome iberidifolia, Benth. in Enum. Pl. Hueg. (1837) p. 59. A native of Australia, known as the *Swan River Daisy*, with blue and white flowers. In gardens. Woodr. Gard. in Ind. ed. 5, p. 362.

Charieis heterophylla, Cass. in Bull. Soc. Philom. (1817) p. 68. A native of S. Africa, cultivated in gardens in Europe and recently introduced into India. The ray-flowers are blue, those of the disk blue or yellow. Woodr. Gard. in Ind. ed. 5, p. 362.

Callistephus hortensis, Cass. in Dict. Sc. Nat. v. 37 (1825) p. 491 (gen. name changed from *Callistemma*, Cass. l. c. v. 6 (1817) Suppl. p. 46). The well-known *German* or *Chinese Aster*. Firminger (Man. Gard. ed. 3, p. 317) says that, to obtain fine flowers, the German imported seed is better than English. Woodr. Gard. in Ind. ed. 5, p. 358. *Callistemma hortense*, Cass. in Dict. Sc. Nat. v. 6 (1817) Suppl. p. 46.

Helipterum roseum, Benth. Fl. Austr. v. 3, p. 640. A native of S. Western Australia, 1–2 ft. high, bearing solitary terminal rose-colored flower-heads. *Acroclinium roseum*, Hook. Bot. Mag. t. 4801; Woodr. Gard. in Ind. ed. 5, p. 362.

Helipterum Manglesii, F. Muell. ex Benth. Fl. Austr. v. 3, p. 640. A native of Western Australia, a very pretty pot-plant bearing small delicate rose-colored *everlasting* flowers. Woodr. Gard. in Ind. ed. 3, p. 362. *Rhodanthe Manglesii*, Lindl. Bot. Reg. t. 1703.

Melampodium paludosum, H. B. & K. Nov. Gen. v. 4, p. 273. A native of Tropical America, with yellow flowers, now become a weed in gardens in Poona. Dalz. & Gibs. Suppl. p. 47. *Melampodium divaricatum*, DC. Prodr. v. 5, p. 520; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649.

Zinnia elegans, Jacq. Coll. Suppl. (1796) p. 152. A well-known garden plant very easy of culture and rapidly becoming naturalized in the Deccan. Grah. Cat. p. 99; Dalz. & Gibs. Suppl. p. 46; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Gard. in Ind. ed. 3, p. 359.

Tithonia tagetiflora, Desf. in Ann. Mus. Par. v. 1 (1802) p. 49, t. 4. A tall soft-wooded shrub reaching 6 ft. high, bearing alternate divided leaves and numerous orange-colored flowers resembling small sunflowers, a native of Mexico. It grows readily either from seeds or cuttings and spreads with great rapidity. Woodr. Gard. in Ind. ed. 5, p. 366.

Helianthus annuus, Linn. Sp. Pl. (1753) p. 904. The *Common Sunflower*, a native of the Western United States of America. Grows to a height of 6 ft. and more, and is common in gardens throughout India. The finest variety of the annual species is *globosus-fistulosus*. Grah. Cat. p. 100; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Gard. in Ind. ed. 5, p. 359; Watt, Dict. Econ. Prod. v. 4, p. 209.—VERN. *Surya-phul*.

Helianthus rigidus, Desf. Cat. Hort. Par. ed. 3, p. 184. The *Small Sunflower*, a native of N.W. America, a recent introduction into gardens at Poona. Mr. Woodrow (Gard. in Ind. ed. 5, p. 363) states that it was lately used at that station in a competition in table-decoration and was much admired. The flower-heads reach 4 in. in diam.; the ray is of a deep golden- and the disk of a very dark chocolate-color.

Helianthus tuberosus, Linn. Sp. Pl. (1753) p. 905. The *Jerusalem Artichoke*, a well-known and much appreciated culinary vegetable, a native of N. America and now very generally cultivated. Grah. Cat. p. 100; Dalz. & Gibs. Suppl. p. 47; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Gard. in Ind. ed. 5, p. 363; Watt, Dict. Econ. Prod. v. 4, p. 211.

Guizotia abyssinica, Cass. in Dict. Sc. Nat. v. 59 (1829) p. 248. A stout erect leafy herb 1–3 ft. high bearing numerous yellow flowers, a native of Tropical Africa, but extensively cultivated in India for the oil produced from the seeds. The oil is used by the poorer classes as a substitute for *ghi*. It is also used to adulterate gingelly and castor oils. Fl. B. I. v. 3, p. 308; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 649; Gard. in Ind. ed. 5, p. 365; Watt, Dict. Econ. Prod. v. 4, p. 186. *Guizotia oleifera*, DC. Sept. Not. Pl. Rar. Jard. Genèv. p. 5; Dalz. & Gibs. p. 128.—VERN. *Kála-til*; *Káralá*; *Rám-til*.

Coreopsis tinctoria, Nutt. in Journ. Acad. Philad. v. 2 (1821) p. 114. A well-known tall handsome annual, a native of N. America. The flower-heads have long yellow rays and a maroon-colored disk. It is a very common plant in gardens and has become almost naturalized

about Belgaum. Woodr. Gard. in Ind. ed. 5, p. 358. *Calliopsis tinctoria*, DC. Prodr. v. 5, p. 568; Grah. Cat. p. 101; Dalz. & Gibs. Suppl. p. 47.

Coreopsis aristosa, Michx. Fl. Bor.-Am. v. 2, p. 140. A dwarf plant similar to the former in the color of the flowers. Leaves deeply pinnatifid. Woodr. Gard. in Ind. ed. 5, p. 358.

Dahlia variabilis, Desf. Cat. Hort. Par. ed. 3, p. 182. Several varieties of this showy flower are grown in gardens in the Deccan, where both single and double Dahlias are much cultivated. Grah. Cat. p. 100; Dalz. & Gibs. p. 47; Woodr. Gard. in Ind. ed. 5, p. 357.

Cosmos bipinnatus, Cav. Icon. v. 1, p. 10, t. 14. A native of Mexico, often grown in gardens. It is about 2 ft. high and bears pretty pink daisy-like flowers. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Gard. in Ind. ed. 5, p. 358.

Flaveria contrayerba, Pers. Syn. v. 2, p. 489. A weed, a native of Peru, which has become naturalized in the Deccan, where it is plentiful about Poona, Bijapur, and Hewra. It has 3-nerved leaves with spinous margins and dense heads of yellow flowers and is medicinal, but by no means an attractive plant. Dalz. & Gibs. Suppl. p. 47; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650.

Tagetes erecta, Linn. Sp. Pl. (1753) p. 887. The *African Marigold*, grown abundantly in the gardens of Europeans and natives. It seems originally to have come from Mexico and grows about 2 ft. high, with erect stem and erect branches. Grah. Cat. p. 99; Woodr. Gard. in Ind. ed. 5, p. 359; Watt, Dict. Econ. Prod. v. 6, part 3, p. 402.

Tagetes patula, Linn. Sp. Pl. (1753) p. 887. The *French Marigold*, a smaller plant than *T. erecta* and with smaller flowers. It grows to a height of 1½ ft., the stem erect, the branches spreading.—It is a native of Mexico. Grah. Cat. p. 99; Dalz. & Gibs. Suppl. p. 46; Woodr. Gard. in Ind. ed. 5, p. 359.—VERN. *Machamul*; *Guljáphiri*.

Gaillardia aristata, Pursh, Fl. Am. Sept. v. 2, p. 573. A very beautiful perennial, 1½ ft. high, recently introduced from N. America. Woodr. Gard. in Ind. ed. 5, p. 362.

Gaillardia pulchella, Fouger, in Mém. Acad. Sc. Par. 1786 (1788) p. 5. An older introduction than the former species. The ray-flowers are crimson tipped with bright yellow, and the plant is about 2–3 ft. high. An improved form of this named *G. Lorenziana* is very handsome and unique in its appearance. The ray- and disk-flowers develop into tubular funnel-shaped 3–5-lobed florets and form handsome flower-heads admirably adapted for cutting (*Nicholson*). Woodr. Gard. in Ind. ed. 5, p. 362. *Gaillardia picta*, Sweet, Brit. Flow. Gard. n. s. 3, t. 267; Dalz. & Gibs. Suppl. p. 48.

Achillea Millefolium, Linn. Sp. Pl. (1753) p. 899. The *Yarrow* or *Milfoil*, a common plant throughout the British Isles, is often seen in gardens in Bombay and Belgaum. Grah. Cat. p. 102; Dalz. & Gibs.

Suppl. p. 48; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 650; Watt, Dict. Econ. Prod. v. 1, p. 78.

Chrysanthemum indicum, Linn. Sp. Pl. (1753) p. 889. A few varieties of this plant, which is a native of China and Japan, are largely grown by market-gardeners for cut flowers. Grah. Cat. p. 102; Dalz. & Gibs. Suppl. p. 48; Woodr. Gard. in Ind. ed. 5, p. 365; Watt, Dict. Econ. Prod. v. 2, p. 272.—VERN. *Gul-daudi.*

Crossostephium artemisoides, Less. in Linnæa, v. 6, p. 220. A small useful bedding-plant, a native of China. It has small alternate much-divided leaves of a greenish-grey color, contrasting well with *Alternantheras* and other dark-colored plants. Propagation by cuttings in sandy soil is easy. Woodr. Gard. in Ind. ed. 5, p. 362.

Calendula officinalis, Linn. Sp. Pl. (1753) p. 921. The *Marigold*, grown everywhere in gardens. Grah. Cat. p. 101; Dalz. & Gibs. Suppl. p. 48; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Gard. in Ind. ed. 5, p. 358; Watt, Dict. Econ. Prod. v. 2, p. 24.

Cynara Cardunculus, Linn. Sp. Pl. (1753) p. 827. The *Cardoon*, of which *Cynara Scolymus*, Linn., the *Globe Artichoke*, is a cultivated form, is sometimes grown, but chiefly as an ornamental plant, as the globe variety rarely forms heads in the Deccan. I have found that the only way of growing the globe artichoke successfully in Poona was by obtaining seed from acclimatized plants from some station in Northern India. Grah. Cat. p. 95; Dalz. & Gibs. Suppl. p. 45; Woodr. Gard. in Ind. ed. 5, p. 364; Watt, Dict. Econ. Prodr. v. 2, p. 678.

Centaurea Cyanus, Linn. Sp. Pl. (1753) p. 911. The well-known *Corn Blue-bottle*, a native of Europe. Often grown in gardens, especially about Belgaum. Grah. Cat. p. 95; Dalz. & Gibs. Suppl. p. 46; Woodr. Gard. in Ind. ed. 5, p. 358.

Carthamus tinctorius, Linn. Sp. Pl. (1753) p. 830. The *Safflower*, cultivated throughout a large part of India and in the black soil districts of the Bombay Presidency, for the use of dyers as well as for the oil extracted from the seeds. The native country of the plant is uncertain. It has been cultivated as a source of a red dye in Spain, Germany, Italy, Persia, China, Egypt, S. America, and S. Russia. DeCandolle says that the cloths found on Egyptian mummies were dyed with it. The dye is prepared from the flowers. A very full description of the mode of preparation of the dye and the oil will be found in Watt's Dict. Econ. Prod. v. 2, pp. 184–195. Fl. B. I. v. 3, p. 386; Grah. Cat. p. 95; Dalz. & Gibs. Suppl. p. 45; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 651; Gard. in Ind. ed. 5, p. 357.—VERN *Kusumba.*

Cichorium Endivia, Linn. Sp. Pl. (1753) p. 813. The *Garden Endive*, cultivated but not nearly so extensively as lettuce, a native of Europe. Grah. Cat. p. 94; Dalz. & Gibs. Suppl. p. 45; Woodr. Gard. in Ind. ed. 5, p. 366; Watt, Dict. Econ. Prod. v. 2, p. 285.

Cichorium Intybus, Linn. Sp. Pl. (1753) p. 813. *Chicory*, occasionally though rarely grown in the Deccan. Woodr. Gard. in Ind. ed. 5, p. 365; Watt, Dict. Econ. Prodr. v. 2, p. 285.

Tragopogon porrifolium, Linn. Sp. Pl. (1753) p. 789, and *Scorzonera hispanica*, Linn. Sp. Pl. (1753) p. 791. The *White* and *Black Salsify* respectively. These may be grown with advantage in the Deccan, especially if irrigation is available, but they are not often planted. I have grown both for several years successively in Poona and have found them very satisfactory. Woodr. Gard. in Ind. ed. 5, p. 365.

Taraxacum officinale, [Weber, in] Wigg. Prim. Fl. Holsat. p. 56. The *Dandelion*, whose roots furnish the well-known medicinal extract. It was grown for many years near Poona, whence the extract was supplied to the Government Medical Stores. Mr. Woodrow, who superintended the work of growing the plant and making the extract, says that a fair crop would yield about 1500 lbs. of fresh roots per acre, from which 18 per cent. of the extract was obtainable. Woodr. Gard. in Ind. ed. 5, p. 362; Watt, Dict. Econ. Prod. v. 6, part 3, p. 414. *Leontodon Taraxacum*, Linn. Sp. Pl. (1753) p. 798; Dalz. & Gibs. Suppl. p. 48.

Order LXXII. GOODENIACEÆ.

Herbs or shrubs; juice not milky. Leaves alternate or radical (very rarely opposite); stipules 0. Flowers hermaphrodite, often irregular, solitary or in axillary or terminal spikes, racemes, or panicles. Calyx-tube adnate to the ovary or rarely free; limb 5-fid or nearly obsolete. Corolla gamopetalous; lobes 5, valvate in bud. Stamens 5, inserted at the base of the corolla and alternate with its lobes; anthers free or connate in a ring round the style. Ovary altogether or partly inferior (rarely free), 1-2-celled; ovules in each cell 1 or many, on the dissepiment; style simple (rarely 2-fid), with a cup-shaped or 2-lipped indusium including the stigma. Fruit a drupe or capsule. Seeds albuminous; embryo straight; radicle next the hilum.—Distrib. Australia, Temperate America, New Zealand, S.E. Asia; species about 200.

1. SCÆVOLA, Linn.

Herbs or shrubs. Leaves alternate (rarely opposite), entire or toothed. Flowers axillary, on a 1-flowered peduncle between 2 opposite bracts, or at the bifurcations of a dichotomously branched peduncle, sessile or pedicelled. Calyx-tube adnate to the ovary, turbinate, ovoid or globose; limb usually short, annular, cup-shaped or 5-partite, sometimes obsolete. Corolla oblique, split at the back to the base; lobes subequal, at length usually digitately spreading. Anthers free. Ovary usually inferior, 2 (rarely 1)-celled; ovules 1–2, erect. Indusium of the style cup-shaped, enclosing the truncate or divaricately 2-lobed stigma. Fruit a drupe; exocarp fleshy, succulent or thinly membranous; endocarp woody or bony, rarely thin and crustaceous.—Distrib. Species about 60, of which about 50 are Australian, 8 Polynesian, and 2 Asiatic.

Leaves 4½–8 in. long; calyx-lobes linear-lanceolate enlarged in fruit; drupe white	1. *S. Kœnigii.*
Leaves 1½–3 in. long; calyx truncate or obscurely lobed; drupe purple	2. *S. Lobelia.*

1. **Scævola Kœnigii**, *Vahl, Symb. Bot.* v. 3 (1794) p. 36. A shrub 4–10 ft. high; stem 6–7 in. in diam.; branches stout, cylindric,

glabrous, pale-green. Leaves 4½–8 by 1½–3½ in., alternate, obovate, obtuse, numerous, sessile, entire, glabrous on both sides, base long-tapering, with a tuft of white wool in its axil; midrib stout, main nerves slender. Flowers white, in short axillary dichotomous cymes much shorter than the leaves, with small woolly bracts in their axils at the bifurcations; buds clavate, obtuse; pedicels short, pubescent. Calyx ¼–⅜ in. long, pubescent; lobes 5, rather distant, ⅛–1/16 in. long, linear-lanceolate or linear-obovate, often enlarged in fruit. Corolla pubescent or glabrous outside, 1–1¼ in. long; tube hairy inside; lobes ⅜–½ in. long, spreading, elliptic-obovate, the central portion of the lobe thick and stiff, prolonged into a stout apiculus, the margins thin, membranous, irregularly toothed and ciliate. Style exceeding ¾ in. long, curved, very hairy, protruded through the split back of the corolla-tube; cup round the stigma (*indusium*) ⅛ in. deep, hairy, ciliate. Drupe about ¾ in. in diam., subglobose, somewhat lobed, very succulent, white when ripe, crowned by the persistent calyx-lobes; stone rough, bony. Fl. B. I. v. 3, p. 421; Trim. Fl. Ceyl. v. 3, p. 54; Talb. Trees, Bomb. ed. 2, p. 201; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162; Watt, Dict. Econ. Prod. v. 6, part 2, p. 484. *Scævola Taccada*, Roxb. Hort. Beng. p. 15; Grah. Cat. p. 103; Dalz. & Gibs. p. 134; Wight, Ill. t. 137. —Flowers: June–Dec. VERN. *Bhadrák*; *Bhadráksh.*

Grows on the sea-coast; sometimes cultivated in gardens, Bombay. KONKAN: *Lambert!*; Rari Fort, *Dalzell & Gibson*; near Ratnagiri on the sea-coast, *Talbot, Woodrow.* SIND: *Dalzell!*—DISTRIB. Sea-shores of India; Ceylon; Tropical East Asia, Australia, Polynesia.

2. **Scævola Lobelia,** *Murr. Syst.* ed. 13 (1774) p. 178. A small shrub decumbent (*Stocks*), branched from the base. Leaves 1½–3 by ¾–1¼ in., elliptic or obovate, subsessile, fleshy, glabrous, narrowed at the base and with entire margins; nerves inconspicuous. Flowers usually in small axillary cymes of 3, the central one sessile; bracts small, fleshy; bracteoles lanceolate. Calyx ⅛–⅙ in. long, truncate or obscurely and obtusely lobed. Corolla ¾ in. long, yellowish; tube hairy inside; lobes ¼ in. long, linear-oblong. Drupe globose, smooth, purple, ½ in. in diam. Fl. B. I. v. 3, p. 421; Talb. Trees, Bomb. ed. 2, p. 201; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162. *Scævola uvifera*, Stocks, in Wight, Icon. t. 1613; Dalz. & Gibs. p. 134. *S. Plumierii*, Vahl, Symb. Bot. v. 2 (1791) p. 36; Trim. Fl. Ceyl. v. 3, p. 55; Aitch. Pb. & Sind Pl. p. 83.

Very near *S. Kœnigii*, from which it differs by the smaller leaves, the truncate calyx and the drupe which is purple and not white.

KANARA: *Thomson!* SIND: mouths of the Indus near Karachi, *Talbot*; sand-drifts of the sea, Karachi, *Vicary!*, *Stocks*, 518!—DISTRIB. Sea-shores of S. India and Sind; Ceylon; warm sea-shores of both hemispheres.

ORDER LXXIII. CAMPANULACEÆ.

Herbs, shrubs, or undershrubs, usually with milky juice. Leaves usually alternate (rarely opposite or verticillate), entire or toothed (rarely lobed); stipules 0. Flowers hermaphrodite (rarely diœcious), axillary or terminal, solitary, subpaniculate or racemose; bracts usually small; bracteoles 0 (except in *Sphenoclea*). Calyx-tube adnate to the

ovary; limb usually 5-lobed or 5-partite (exceptionally 3–10-partite), usually persistent and enlarging after the corolla withers; the lobes equal or slightly unequal. Corolla gamopetalous, tubular, campanulate, rarely infundibuliform or rotate, straight or oblique; limb regular, or oblique, or bilabiate; lobes as many as those of the calyx, short or more or less deeply divided, valvate or induplicate-valvate, rarely 1 or 2 or all the petals free to the base. Stamens as many as the corolla-lobes and alternate with them, usually inserted on the disk, sometimes on the tube of the corolla near the base or higher up and adnate; filaments free or cohering at the top or throughout their entire length; anthers linear, oblong or rarely ovate, free or united into a tube, 2-celled, the cells parallel, introrse, dehiscing longitudinally. Ovary inferior, ½-superior or rarely almost superior, 2–5 (rarely 6–10) -celled; placentas axile or attached to the middle of the septa, stipitate or peltate; ovules numerous or rarely only 2, at the base or apex of each cell, anatropous, erect, horizontal or pendulous. Style simple, clavate at the apex, papillose, at first enclosed by the anthers, afterwards protruding beyond them; stigmatic lobes as many as the cells of the ovary. Fruit capsular, baccate or dry (in *Sphenoclea* with circumcissile dehiscence). Seeds numerous, small; testa thin or coriaceous, smooth or reticulated; embryo straight in the axis of the albumen; radicle next the hilum.—DISTRIB. Genera 53; species more than 1000, scattered throughout the globe.

Corolla irregular, 2-lipped; anthers connate round the style .	1. LOBELIA.
Corolla regular or only slightly oblique; anthers free.	
Capsule dehiscing at the top within the calyx-teeth into as many valves as there are cells.	
Corolla deeply 5-partite into narrow lobes.	
Slender annuals with minute flowers on long filiform peduncles; lobes of the stigma short and broad	2. CEPHALOSTIGMA.
Corolla with short broad lobes, rarely divided below the middle; lobes of the stigma narrow.....	3. WAHLENBERGIA.
Capsule with circumcissile dehiscence	4. SPHENOCLEA.
Capsule dehiscing at the base or sides below the calyx-teeth	5. CAMPANULA.

1. **LOBELIA,** Linn.

Herbs or undershrubs. Leaves alternate. Peduncles 1-flowered, solitary in the axils of leaves or bracts, sometimes in a terminal raceme; bracteoles very small, usually 0. Calyx superior; limb 5-partite, the segments slightly unequal. Corolla oblique, more or less distinctly 2-lipped. Staminal-tube free from the corolla or very rarely adnate at the very base; anthers 2 or all penicillate at the apex. Ovary inferior or ½-superior, 2-celled; placentas ∞-ovulate. Stigma shortly 2-fid. Capsule loculicidally 2-valved within the calyx-lobes. Seeds very many, minute, ellipsoid, compressed or trigonous.—DISTRIB. All temperate and warm regions of the world; rare in Central Europe and East and West Asia; species about 200.

Small herbs not exceeding 18 in. high.	
Seeds trigonous; anthers all penicillate at the tip.....	1. *L. trigona.*
Seeds ellipsoid, compressed; two of the anthers penicillate at the tip	2. *L. trialata.*
Large erect herb 4–10 ft. high	3. *L. nicotianæfolia.*

1. **Lobelia trigona,** *Roxb. Fl. Ind.* v. 1 (1832) p. 506. Annual, 1½–12-in., or sometimes even more; branches ascending, rooting near the base, more or less trigonous, glabrous. Leaves subsessile, ½–¾ by $\frac{5}{16}$–½ in., ovate, acute, crenate-dentate, glabrous. Flowers axillary; peduncles angular, longer than the leaves, with conspicuous bracts at their base which sometimes appear like stipules. Calyx glabrous; lobes linear, acute, as long as or longer than the tube. Corolla ⅛–¼ in. long, blue or violet; lobes ovate, elliptic. Anthers all penicillate at the apex. Capsule ⅛ by ⅛ in., ellipsoid. Seeds ellipsoid, narrowed at both ends, about $\frac{1}{50}$ in. long, distinctly trigonous. Fl. B. I. v. 3, p. 423; Dalz. & Gibs. p. 133 (exclud. syn.); Wight, Icon. t. 1170; Trim. Fl. Ceyl. v. 3, p. 56; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162; Watt, Dict. Econ. Prod. v. 5, p. 87.—Flowers: Aug.-Oct.

Konkan: Bombay, *Cooke*!, *Stocks*!; Neral, *Woodrow*! Deccan: Mahableshwar, *Cooke*!; Kolhapur, *Woodrow*!; Panchgani, *Woodrow*! S. M. Country: Londa, *Bhiva*!—Distrib. More or less throughout India; Ceylon.

2. **Lobelia trialata,** *Buch.-Ham. in Don, Prod. Nep.* p. 157. Annual; stems 6–15 in., often 3-winged, suberect, branched. Leaves subsessile or the lower sometimes shortly petioled, ovate, elliptic or the upper lanceolate, ¼–1 by ⅛–¾ in., glabrous, the margins crenate-serrate or dentate, base narrowed. Flowers axillary, solitary; pedicels slender, usually equalling the leaves, with minute bracts at the base. Calyx glabrous, about ¼ in. long in flower; lobes linear, acute, as long as the tube. Corolla ⅙–¼ in. long, blue or violet. The 2 lower anthers only penicillate at the apex, the 3 upper naked. Capsules ⅓ by ⅛ in. Seeds ellipsoid, compressed, not trigonous. Bentham (Fl. Hongkong. p. 197) unites this with *Lobelia trigona*, but the shape of the seed is sufficient to separate the 2 species. *L. trigona* has moreover all the anthers bearded, while *L. trialata* has 3 of the anthers naked at the tip. Fl. B. I. v. 3, p. 425; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162.—Flowers: July–Nov.

Not common. Konkan: Bombay, *Stocks*!; Ambeghát, *Woodrow*. Deccan: Mahableshwar, *Woodrow*.—Distrib. India (N. Provinces, W. Peninsula); mountains of Ava, Java, Abyssinia.

3. **Lobelia nicotianæfolia,** *Heyne, in Roth, Nov. Pl. Sp.* (1821) p. 143. A very large biennial or perennial herb; stem stout, hollow, 4–10 ft. high, branched upwards; branches cylindric, slightly pubescent. Leaves alternate, numerous, sessile or nearly so, light green, the lower sometimes reaching 18 by 2–3 in., the uppermost only about 3 by ¾ in. and then passing into floral leaves or bracts, all oblong-lanceolate, acute, finely serrulate, usually glabrous above, glabrous or pubescent beneath, tapering at the base; midrib white; main nerves many, slender. Flowers in terminal racemes sometimes more than 1 ft. long; pedicels pubescent, each supported by a leaf-like lanceolate bract. Calyx-tube pubescent or glabrous; lobes ½ in. long, about twice as long as the subglobose tube, linear-lanceolate, acuminate, with toothed and ciliate margins. Corolla 1–1½ in. long, much curved, pubescent or glabrous, white; lobes long, linear, 3 usually connate throughout. Filaments connate into a tube, ⅝ in. long, curved, dilated at the base; anthers ¼ in. long, dark-purple, linear, obtusely pointed, curved, glabrous or with a few white hairs on the back, the 2 lower often with a bunch of long

white glistening hairs $\frac{1}{12}$ in. long at the tip. Capsule $\frac{1}{3}$ in. in diam., subglobose, opening by 2 valves. Seeds very small, ellipsoid, compressed, yellowish-brown, extremely acrid (*Dalzell & Gibson*). A yellow viscid secretion is often found on the peduncles in thick drops. Odor very disagreeable. Fl. B. I. v. 3, p. 427; Grah. Cat. p. 102; Dalz. & Gibs. p. 133; Wight, Ill. t. 135; Trim. Fl. Ceyl. v. 3, p. 57; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162; Watt, Dict. Econ. Prod. v. 5, p. 86.—Flowers: Nov.–Mar. VERN. *Dhaval*; *Boknal*.

Common on the Western Ghâts. KONKAN: *Stocks*!, *Lambert*!; Matheran, Baikra road to Gharbat Point, *Cooke*! DECCAN: Khandala, *Woodrow*!; hills about Pârr, abundant, *Graham*. S. M. COUNTRY: Castlerock, *Kanitkar*!—DISTRIB. India (W. Peninsula); Ceylon.

2. CEPHALOSTIGMA, A. DC.

Annual slender erect herbs, often hairy. Leaves alternate, subsessile. Flowers very small, laxly racemose or paniculate; pedicels filiform. Calyx-tube adnate to the ovary; limb 5-partite. Corolla 5-partite almost to the base, blue or white; lobes narrow. Stamens free from the corolla; filaments dilated at the very base; anthers free. Ovary inferior, 2–3-celled; placentas many-ovuled; style shortly conical at the base; stigma 2–3-fid with short lobes. Capsule conical at the top, 2–3-valved within the persistent calyx-lobes. Seeds very many, small. —DISTRIB. India, Tropical Africa, Brazil; species 9.

Stem erect, reaching 16 in. long; leaves oblong; seeds much longer than broad	1. *C. Schimperi*.
Stem flexuose, less than 10 in. long, more or less zigzag; leaves broadly ovate; seeds scarcely longer than broad	2. *C. flexuosum*.

1. **Cephalostigma Schimperi,** *Hochst. ex A. Rich. Tent. Flor. Abyss.* v. 2 (1851) p. 2. A slender annual 3–16 in. high; stem erect, rarely branched near the base and, as well as the branches, angular, hispid with spreading hairs. Leaves $\frac{3}{4}$–1 by $\frac{1}{4}$–$\frac{3}{8}$ in., subsessile, oblong, acute, narrowed at both ends and with undulate crisped subdentate margins, sparsely clothed with rigid hairs above and on the nerves beneath. Flowers in very lax cymes terminating most of the branches; pedicels filiform, $\frac{1}{4}$–$\frac{3}{4}$ in. long, pubescent. Calyx $\frac{1}{6}$–$\frac{1}{5}$ in. long; tube turbinate or subhemispheric, hispidly hairy; lobes about equalling the tube, erect, triangular, acute, with thickened and prominent margins, glabrous. Corolla divided nearly to the base, blue; segments lanceolate, acute, $\frac{1}{6}$ in. long. Capsule hispid. Seeds much longer than broad, ellipsoid, about $\frac{1}{10}$ in. long, pale-brown, smooth. Fl. B. I. v. 3, p. 428; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162. *Cephalostigma hirsutum*, Hook. f. & Thoms. in Journ. Linn. Soc. v. 2 (1858) p. 9, partly (*not* of Edgew.); Dalz. & Gibs. p. 133.—Flowers: Oct.–Dec.

KONKAN: *Stocks*!, *Dalzell*! DECCAN: Panchgani, *Woodrow*! S. M. COUNTRY: Belgaum (shady places), *Ritchie*, 1101!; Dharwar, *Woodrow*.—DISTRIB. India (W. Peninsula, Khasia); Ceylon.

2. **Cephalostigma flexuosum,** *Hook. f. & Thoms. in Journ. Linn. Soc.* v. 2 (1858) p. 9. Annual, 5–9 in. high, dichotomously branched; stem and branches slender, more or less zigzag, angular, hispid with white hairs. Leaves thin, subsessile, $\frac{3}{4}$–1 by $\frac{1}{2}$–$\frac{5}{8}$ in., ovate-elliptic, subacute, glabrous or nearly so above, hispid with white hairs on the

nerves beneath, margins flat, entire or irregularly crenate-dentate. Flowers in lax cymes terminating most of the branches; pedicels slender, sometimes 1 in. long. Calyx $\frac{1}{6}$–$\frac{1}{5}$ in. long; tube densely hispid, turbinate or subhemispheric; lobes about as long as the tube, lanceolate, acute, apiculate, the margins scarcely thickened. Corolla blue, deeply 5-partite; segments linear-oblong, slightly exceeding the calyx. Seeds not much longer than broad. Fl. B. I. v. 3, p. 428; Dalz. & Gibs. p. 133; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162.—Flowers: Nov.

Konkan: *Stocks*!, *Dalzell*! Kanara: Birchi (N. Kanara), *Woodrow*.—Distrib. India (W. Peninsula).

3. **WAHLENBERGIA,** Schrad.

Annual or perennial herbs. Leaves alternate (rarely opposite). Flowers usually blue and nodding, solitary or variously paniculate; peduncles terminal, axillary or leaf-opposed. Calyx-tube adnate to the ovary, hemispheric, turbinate or obconic-oblong; limb 5 (rarely 3–4)-partite. Corolla campanulate, infundibuliform, tubular or subrotate, usually 5 (rarely 3–4)-fid to or below the middle. Stamens free from the corolla; filaments usually dilated at the base; anthers free. Ovary inferior or ½-superior, 2–5-celled; ovules numerous; styles cylindric; stigma 2–5-fid with narrow lobes. Capsule inferior or ½-superior, erect, dehiscing loculicidally within the persistent calyx-lobes into as many valves as there are cells. Seeds numerous, small.—Distrib. Chiefly in the southern hemisphere, especially S. Africa, a few in Tropical America and the Mediterranean region, one widely dispersed in Western Europe; species about 80.

1. **Wahlenbergia gracilis,** *Schrad. Blumenb.* (1827) p. 38, in obs.; *A. DC. Monogr. Campan.* (1830) p. 142. A perennial herb 6–18 in. high, erect or decumbent, branched from the base; stems and branches glabrous or slightly hairy. Leaves sessile, ½–1½ by $\frac{1}{10}$–⅜ in., linear-oblong, almost entire (except the lower leaves which are often more or less toothed), usually glabrous above, more or less hairy beneath. Flowers in lax cymose panicles; bracts linear, acute; pedicels very long, slender. Calyx ¼–⅜ in. long, usually glabrous; tube turbinate; lobes $\frac{1}{12}$–⅛ in. long, linear from a triangular base, erect, persistent. Corolla blue, ⅛–½ in. long, campanulate, divided below the middle into 5 spreading, oblong, subacute lobes. Filaments much enlarged and pubescent at the base. Capsule ¼–⅓ in. long, tapering into the pedicel, turbinate, crowned with the calyx-lobes. Seeds ellipsoid, slightly compressed, smooth, yellowish-brown. Fl. B. I. v. 3, p. 429; Trim. Fl. Ceyl. v. 3, p. 58; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162. *Wahlenbergia agrestis,* A. DC. Prodr. v. 7, p. 434; Wight, Icon. t. 1175; Dalz. & Gibs. p. 134. *Campanula dehiscens,* Roxb. Hort. Beng. p. 85; Grah. Cat. p. 103.—Flowers: Dec.–Feb. Vern. *Kerdi.*

Not very common, found on the highest Ghâts. Konkan: Matheran, *Nairne.* Deccan: Mahableshwar, *Cooke*!, in the rocky bed of the Yenna above the fall, *Graham*; Khandala, *Kanitkar*!; Lanoli, *Woodrow*!—Distrib. Throughout India; Ceylon, East Asia, Australia, N. Zealand, S. Africa.

4. **SPHENOCLEA,** Gærtn.

An annual erect glabrous marsh herb. Leaves alternate, quite entire. Flowers small, sessile, 2-bracteolate, in terminal and lateral dense pedunculate cylindric (or when young subconic) bracteate spikes. Calyx-tube adnate to the ovary, hemispheric; limb 5-partite, the lobes triangular-ovate, obtuse. Corolla campanulate, 5-lobed, valvate. Stamens 5, inserted at the very base of the corolla-tube; filaments shortly dilated at the base; anthers short, free. Ovary ½-inferior, 2-celled; ovules many, on stalked placentas; style very short; stigma obscurely 2-lobed. Capsule ½-superior, membranous and somewhat turbinate and angular below, flat-topped, circumcissilely dehiscing at the margin of the calyx-tube, the operculum deciduous with the calyx-lobes. Seeds very numerous, minute oblong.—DISTRIB. Widely dispersed throughout the warmer regions of both hemispheres; species 1.

1. **Sphenoclea zeylanica,** *Gærtn. Fruct.* v. 1 (1788) p. 113, t. 24, fig. 5. An erect annual herb 1–3 ft. high; stem stout, succulent, glabrous, slightly branched. Leaves 1–3 by ¼–¾ in., lanceolate-oblong, acute, glaucous-green, glabrous; petiole ⅛–½ in. long. Flowers greenish-yellow, sessile, each with 1 small bract and 2 bracteoles at their base, in dense erect tapering spikes ¾–2 in. long; peduncles of the spikes ¼–1 in. long. Calyx glabrous; lobes $\frac{1}{16}$ in. long (slightly enlarged in fruit), triangular-ovate, obtuse, with membranous margins, folded over the top of the capsule in fruit. Corolla broadly campanulate, 5-lobed. Capsules chartaceous, flat-topped, crowned with the persistent calyx-lobes, somewhat wedge-shaped and angled downwards from the pressure of the adjacent capsules which are closely packed on the spike. Seeds minute, narrowly oblong, microscopically scabrous. Fl. B. I. v. 3, p. 438; Grah. Cat. p. 248; Trim. Fl. Ceyl. v. 3, p. 59. *Sphenoclea Pongatium*, A. DC. Prodr. v. 7 (1838) p. 548; Wight, Ill. t. 138.—Flowers: Oct.–Dec.

Tolerably common in damp places. KONKAN: in rice-fields, *Graham*; Bassein, *Cooke*!; Kalyan, *Woodrow*; Vingorla, *Kanitkar*! SIND: Bubak, *Woodrow*.—DISTRIB. Throughout India in swampy places; Ceylon; warm regions in both hemispheres.

5. **CAMPANULA,** Linn.

Perennial (less commonly annual) herbs, erect or decumbent. Leaves alternate or the radical subrosulate. Flowers usually blue, more rarely violet or white, solitary, pedunculate, terminal or axillary, or in a terminal usually pyramidal panicle. Calyx-tube adnate to the ovary, hemispheric, turbinate or obovoid; limb deeply 5-fid or 5-partite, the sinuses sometimes furnished with flattened reflexed appendages. Corolla campanulate, more or less deeply 5-lobed. Stamens free from the corolla; filaments usually dilated at the base; anthers free. Ovary inferior, 3 (rarely 4–5)-celled; ovules numerous in each cell; stigma narrowly 3- or 5-fid. Capsule inferior (rarely ½-superior), crowned with the calyx-lobes, obovoid or elongate, truncate, dehiscing by small valves at the base or on the side outside the calyx-lobes. Seeds usually numerous, small.—DISTRIB. Widely dispersed, chiefly throughout the northern hemisphere, especially in the Mediterranean region; species about 230.

1. **Campanula Alphonsii,** *Wall. Cat.* (1828) 1296. A decumbent herb; stems many from the base, obscurely angled, wiry, softly hairy, reaching 15 in. long. Leaves $\frac{1}{3}$–1 by $\frac{1}{6}$–$\frac{1}{2}$ in., subsessile, ovate-elliptic, subacute, rugose, hairy on both surfaces and with toothed margins. Flowers solitary or in lax terminal cymose panicles; pedicels hairy. Calyx hairy, $\frac{1}{4}$–$\frac{5}{16}$ in. long; lobes $\frac{3}{16}$ in. long, triangular, acute, sometimes (in the Bombay specimens *usually*) with small alternating teeth, the margins entire or sometimes toothed. Corolla pubescent outside, reaching nearly $\frac{1}{2}$ in. long, divided about $\frac{1}{2}$-way down; lobes oblong, subacute. Filaments dilated and finely pubescent at the base. Anthers $\frac{1}{8}$ in. long. Style $\frac{1}{4}$ in. long, stout; stigma with 3 narrow, at length revolute lobes $\frac{1}{8}$ in. long. Capsule dehiscing by valves at the base. Seeds oblong-ellipsoid, $\frac{1}{30}$ in. long. Fl. B. I. v. 3, p. 440; Wight, Icon. t. 1177; Hook. f. & Thoms. in Journ. Linn. Soc. v. 2 (1858) p. 24; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162.—Flowers: Oct.

Very rare. *Dalzell*, without locality in Herb. Kew.! Deccan: Sinhagad Fort, 12 miles from Poona, *Bhiva*!—Distrib. India (W. Peninsula).

A somewhat variable plant. Mr. C. B. Clarke remarks (Fl. B. I. l. c.) that the leaves of Dalzell's single specimen are larger than those of the type. This is also the case in the specimens from Sinhagad Fort in the Deccan, the leaves of which are similar to those of Dalzell's specimen. Wight (Icon. t. 1177) shews the flowers solitary and terminal, although in some of the specimens from his own herbarium they are more or less paniculate. They are paniculate in all the Bombay specimens. Wight's figure also shows a creeping rhizome from which the branches ascend. This is not the case in any of the specimens seen by me, in all of which the stems are tufted.

Order LXXIV. PLUMBAGINACEÆ.

Herbs or shrubs often maritime. Leaves: radical rosulate; cauline alternate; stipules 0. Flowers regular, hermaphrodite, sessile or shortly pedicelled, on simple or branched scapes or peduncles, solitary, capitate or spicate, the spikes solitary or panicled, often unilateral; bracts usually rigid, dry, with scarious margins. Calyx inferior, gamosepalous, tubular or infundibuliform, 5–10-ribbed, often hyaline between the ribs; limb more or less distinctly 5-lobed. Corolla hypogynous, gamopetalous, hypocrateriform; or petals nearly or wholly free, oblanceolate or obovate, imbricate. Stamens as many as and opposite the corolla-lobes or petals, adnate to the tube or base of the claw, or inserted with the petals on a narrow hypogynous ring. Ovary free, 1-celled, often 5-sulcate; styles 5, free from the base or more or less connate; ovule solitary, anatropous, suspended from a long basal funicle. Fruit included within the calyx (rarely exserted), dry, dehiscent or indehiscent. Seed filling the cell, pendulous from the apex of the funicle or more or less adnate to it; testa membranous; albumen farinaceous, copious, scanty, or 0.—Distrib. More or less throughout the world, chiefly maritime or in saline or rocky deserts; genera 8; species about 200.

Styles 5, free from base or nearly so	1. Statice.
Styles connate throughout their entire length.	
Calyx densely clothed with stalked glands	2. Plumbago.
Calyx eglandular	3. Vogelia.

1. **STATICE,** Linn.

Herbs or small shrubs. Leaves alternate, often rosulate or fascicled, entire (in the Indian species), spathulate-oblong or obovate. Flowers in unilateral bracteate panicled spikes arranged along the branches of a leafless peduncle or scape; bracts subtending the spikes short, squamiform, amplexicaul, coriaceous on the back and with membranous margins; bracteoles sheathing the flowers. Calyx tubular or infundibuliform; tube ribbed; limb scarious, plicate, often colored, spreading in flower, with 5 nerves excurrent into teeth or awns, rarely deeply 5-lobed, or almost obsolete, or reduced to plumose awns, or to 5 recurved mucros. Petals spathulate-oblong, entire or 2-partite, united at the base into a ring with the stamens. Styles 5, distinct, at the angles of the ovary; stigmas subcapitate. Utricle included in the calyx, indehiscent, or circumciss, or variously fissured. Seed filling the cell, more or less albuminous.—DISTRIB. Cosmopolitan on sea-shores and in salt-marshes; species about 100.

1. **Statice Stocksii,** *Boiss. in DC. Prodr.* v. 12 (1848) p. 664. A low-branched plant 6–10 in. high, with a woody stem and leafy branches. Leaves $\frac{3}{8}$–$\frac{3}{4}$ by $\frac{1}{6}$–$\frac{3}{8}$ in., flat, fleshy, glabrous or scarcely puberulous, spathulate-oblong, rounded at the apex, much tapering at the base into an obscure petiole, which is dilated into an amplexicaul obliquely truncate sheath at the base. Scapes somewhat angular, bearing a small subsecund panicle; bracts $\frac{1}{8}$ in. long, elliptic, herbaceous, reddish. Calyx $\frac{1}{8}$ in. long, narrowly infundibuliform, pointed at the base; tube straight, with red ciliate ribs; limb white, membranous, one of the ribs of the tube prolonged to the apex of each lobe. Petals longer than the calyx, spathulate-oblong, truncate or slightly emarginate at the apex, pink. Stamens long-exserted. Fl. B. I. v. 3, p. 480; Wight, Ill. v. 2, p. 225, t. 178; Hook. Icon. Pl. t. 837; Aitch. Pb. & Sind Pl. p. 84; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162.—Flowers: Dec.–Mar.

In the Bombay Presidency confined apparently to Kathiawar and Sind. GUJARAT: Veráwal (Kathiawar), *Bhiva*! SIND: *Stocks*, 436!, *Cooke*!, *Dalzell*, 69!; Karachi, *Vicary*; Tata (lower Sind), *Ritchie*, 615!—DISTRIB. Beluchistan.

2. **PLUMBAGO,** Linn.

Perennial herbs or undershrubs, sometimes scandent. Leaves alternate, membranous, entire (in 1 species absent), amplexicaul and auricled at the base, or with a petiole which is often dilated and amplexicaul. Flowers white, rose-colored, or blue, in terminal spikes; bracts and bracteoles shorter than the calyx, sometimes minute. Calyx tubular, 5-toothed, clothed with prominent stipitate glands. Corolla hypocrateriform; tube long, slender; limb spreading, with 5 equal or slightly unequal entire lobes. Stamens hypogynous, free from the corolla; filaments dilated at the base; anthers linear-oblong. Ovary attenuated at the apex into a terminal filiform style which divides above into 5 longitudinally stigmatose branches. Capsule membranous, at length circumciss near the base, the deciduous part often splitting into 5 valves from the base to the apex. Albumen scanty.—DISTRIB. Warmer regions of the world; species 10.

1. **Plumbago zeylanica,** *Linn. Sp. Pl.* (1753) p. 151. A perennial herb, sometimes, in shady places, subscandent; stems 2–5 ft. long, somewhat woody, spreading, terete, striate, glabrous. Leaves thin, 1½–3 by ⅞–1½ in., ovate, subacute, entire, glabrous, somewhat glaucous beneath, reticulately veined, shortly and abruptly attenuated into a short petiole; petiole narrow, amplexicaul at the base and there often dilated into stipule-like auricles. Flowers in elongate spikes; rhachis glandular, striate; bracteoles ovate, acuminate, shorter than the calyx, glandular or not. Calyx ⅜–½ in. long, narrowly tubular, persistent, densely covered with stalked glands; teeth small, with membranous margins. Corolla white, slender; tube ¾–1 in. long; lobes ⅓ in. long, obovate-oblong, acute, apiculate. Filaments as long as the corolla-tube; anthers exserted just beyond the throat. Capsule oblong, pointed; pericarp thin below, thick and hardened above. Fl. B. I. v. 3, p. 480; Grah. Cat. p. 166; Dalz. & Gibs. p. 220; Wight, Ill. t. 179; Trim. Fl. Ceyl. v. 3, p. 65; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162; Watt, Dict. Econ. Prod. v. 6, part 1, p. 295.—Flowers: Aug.-Sept. VERN. *Chitrak.*

KONKAN: rocky places, *Dalzell & Gibson*; hills throughout the Konkan, *Graham.* DECCAN: Khandala, *Cooke!*; Bhor Ghát, *Cooke!*; Ahire, west of Poona, *Raoji!*; Deccan hills, *Woodrow*; Mahableshwar, *H. M. Birdwood.*

The root is largely employed in medicine. Sanskrit writers state that it promotes appetite and is useful in dyspepsia and other diseases. A paste made from the root is employed as a vesicant and applied in leprosy and other skin-diseases as well as in rheumatism. See Watt, Dict. Econ. Prod. l. c.—DISTRIB. Throughout India, much cultivated, wild in the W. Peninsula and probably in Bengal; Ceylon, Tropics of the Old World.

Plumbago rosea, Linn. Sp. Pl. ed. 2 (1762) p. 215. A shrub 2–3 ft. high. Flowers rosy-scarlet, 1½–2 in. long. A native of Sikkim and Khasia, cultivated throughout India as an ornamental as well as a medicinal plant. Fl. B. I. v. 3, p. 481; Grah. Cat. p. 166; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162; Gard. in Ind. ed. 5, p. 369; Firminger, Man. Gard. ed. 3, p. 514; Watt, Dict. Econ. Prod. v. 6, part 1, p. 294. *P. coccinea,* Boiss. in DC. Prodr. v. 12, p. 693; Dalz. & Gibs. Suppl. p. 71.—Flowers: more or less throughout the year. VERN. *Lál-Chitrak.*

Plumbago capensis, Thunb. Prodr. Capen. (1794) p. 33. A small shrub, a native of the Cape of Good Hope. Leaves arranged in a succession of whorls of 5 unequal lanceolate leaves, ½–2 in. long. Bears a profusion of pale-blue flowers in the hot and rainy seasons and is cultivated in gardens as an ornamental plant. Grah. Cat. p. 166; Dalz. & Gibs. Suppl. p. 72; Firminger, Man. Gard. ed. 3, p. 514; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162; Gard. in Ind. ed. 5, p. 369.—Flowers: May–Dec. VERN. *Kálá-chitrak.*

3. VOGELIA, Lamk.

Shrubs or undershrubs more or less scaly. Leaves alternate. Spikes terminal, subpaniculate; pedicels very short; bracts and bracteoles small. Calyx eglandular, deeply 5-fid, 5-ribbed, and with 5 broad mem-

branous transversely undulate wings between the ribs on the calyx-tube. Corolla infundibuliform; tube long, slender; limb campanulate, with 5 lobes truncate or emarginate at the apex. Stamens free; filaments filiform, shortly dilated at the very base; anthers oblong, small. Ovary oblong-fusiform, more or less 5-gonous, attenuated at the apex; style filiform, terminal, with 5 branches stigmatose throughout. Capsule included in the calyx, circumciss at the very base, splitting into 5 valves from the base towards the apex.—DISTRIB. Species 3, one S. African, the others Indian and Arabian.

1. **Vogelia indica,** *Gibs. ex Wight, in Calc. Journ. Nat. Hist.* v. 7 (1847) p. 17. An erect undershrub 6–10 ft. high, of a glaucous hue; stem and branches terete, finely striate, more or less scurfy. Leaves pale-glaucous-green, perfoliate, very thick and coriaceous, the lower ovate, subobtuse, reaching 5 by 3 in., with undulate margins, the upper elliptic, obtuse, or orbicular, 1½–2 by 1–1¾ in., all more or less covered with scurfy scales. Flowers in dense paniculate spikes, closely packed towards the ends of the rhachises; bracts lanceolate, reddish. Calyx eglandular, persistent, tubular, ⅛–⅜ in. long, strongly 5-ribbed, the tube winged between the ribs, the wings transversely undulate, membranous; lobes about ½ the length of the calyx, lanceolate, acute, membranous, erect, transversely undulate, the ribs extending to the apex of the lobes. Corolla-tube cylindric, ⅜ in. long; lobes ⅙–¼ in. long, obovate-oblong, emarginate, apiculate. Stamens included within the corolla, just exserted beyond the throat. Style densely hairy at the base; branches short, linear. Capsule ¼–5/16 in. long, circumciss at the very base, splitting into 5 valves with membranous margins. Seed ⅛ in. long, smooth, pear-shaped; funicle very long. Fl. B. I. v. 3, p. 481; Wight, Icon. t. 1075; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162. *Vogelia arabica*, Boiss. in DC. Prodr. v. 12 (1848) p. 696; Dalz. & Gibs. p. 220.—*Flowers*: Dec.

A rare plant in the Bombay Presidency except in Kathiawar, where it may be found in tolerable abundance both at Rajkot and Porbandar. DECCAN: near Hewra, *Gibson*. KANARA: *Law*! GUJARAT: Porbandar (Kathiawar), *Cooke*!—DISTRIB. India (W. Peninsula, tolerably abundant below Mount Abu in Rajputana); Arabia.

ORDER LXXV. PRIMULACEÆ.

Perennial (rarely annual) herbs. Leaves radical or cauline; stipules 0. Flowers hermaphrodite, regular. Calyx inferior (except *Samolus*), 5 (rarely 4–9) -cleft. Corolla usually hypogynous (0 in *Glaux*), rotate, campanulate or infundibuliform, 5 (rarely 4–9) -cleft. Stamens inserted on the corolla-tube and opposite to its lobes (hypogynous when there is no corolla); filaments usually short; anthers 2-celled, bursting inwards by slits (rarely by terminal pores), pollen angular. Ovary 1-celled, usually free, ovoid or subglobose; ovules many, usually amphitropous, on a free central placenta; style short or long, continuous with the ovary; stigma undivided. Capsule 1-celled, dehiscing by simple or 2-fid valves or transversely. Seeds few or many, minute, usually angular, often sunk in the placenta; albumen fleshy or horny; embryo terete, parallel to the hilum.—DISTRIB. Temperate and alpine

regions of the N. hemisphere, less frequent in the S. hemisphere, rare in the Tropics; genera 21; species about 250.

Corolla 5-partite, exceeding the calyx; filaments villous ..... 1. ANAGALLIS.
Corolla 4–5-partite, shorter than the calyx; filaments glabrous. 2. CENTUNCULUS.

1. **ANAGALLIS,** Linn.

Annual or perennial herbs usually glabrous. Leaves opposite, quite entire. Flowers red or blue (rarely white), on axillary 1-flowered peduncles; bracts 0. Calyx 5-partite; lobes shorter than the corolla, persistent. Corolla hypogynous, rotate or infundibuliform, 5-partite. Stamens 5, inserted at the base of the corolla; filaments filiform, villous. Ovary globose; ovules many, amphitropous; style simple, filiform; stigma obtuse. Capsule globose, operculately dehiscent. Seeds many, plano-convex, peltate.—DISTRIB. Europe, Temperate Asia, N. Africa, S. America; species 12.

1. **Anagallis arvensis,** *Linn. Sp. Pl.* (1753) p. 148. Annual, branched from the base, 5–15 in. high, erect or procumbent; stem and branches 4-gonous, glabrous. Leaves $\frac{3}{8}$–1 by $\frac{1}{4}$–$\frac{1}{2}$ in., sessile, opposite, ovate, acute, glabrous, entire, gland-dotted. Flowers axillary, solitary; peduncles $\frac{1}{2}$–$1\frac{1}{2}$ in. long, slender, erect in flower, decurved in fruit. Calyx $\frac{1}{4}$ in. long, divided nearly to the base; segments narrow, lanceolate, acuminate, slightly shorter than the corolla. Corolla rotate, $\frac{1}{3}$–$\frac{1}{2}$ in. in diam., blue. Filaments villous. Capsule size of a small pea, operculately dividing about the middle, the style persistent on the operculum. Seeds minute, trigonous. This appears to be var. *cærulea* (*A. cærulea* (sp.), Lamk. Fl. Fr. ed. 1, v. 2 (1778) p. 285). Fl. B. I. v. 3, p. 506; Dalz. & Gibs. p. 136; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162; Watt, Dict. Econ. Prod. v. 1, p. 235; Hook. f. Stud. Flor. Br. Isl. ed. 3, p. 265.—Flowers: Sept.-Dec.

Found sparingly throughout the Deccan. DECCAN: *Woodrow*; Panchgani, *Cooke!*, *C. Macnaghten!*—DISTRIB. More or less throughout India; Europe, W. Asia, and introduced into most temperate regions.

2. **CENTUNCULUS,** Linn.

Very small annual glabrous herbs. Leaves alternate or the lower opposite, sessile or shortly petiolate, quite entire. Flowers minute, solitary, axillary, white or pink; bracts 0. Calyx 4–5-partite; lobes lanceolate, longer than the corolla, persistent. Corolla small, hypogynous, 4–5-fid, urceolate, persistent; tube subglobose; lobes spreading, acute. Stamens 4–5, inserted on the throat of the corolla; filaments short, flattened, glabrous; anthers broadly ovate or cordate. Ovary subglobose; ovules numerous, inserted on a globose placenta, amphitropous; style filiform; stigma obtuse, capitate. Capsule globose, operculately dehiscent. Seeds many, minute, peltate.—DISTRIB. Temperate warm regions of the globe; species 3 or 4.

1. **Centunculus tenellus,** *Duby, in DC. Prodr.* v. 8 (1844) p. 72. An erect branched glabrous annual $2\frac{1}{2}$–8 in. high. Leaves subsessile, $\frac{1}{8}$–$\frac{1}{4}$ by $\frac{1}{16}$–$\frac{1}{8}$ in., alternate, broadly ovate or obovate, subacute, apiculate, entire. Flowers axillary, solitary; peduncles filiform, $\frac{1}{4}$–$\frac{5}{16}$ in. long. Calyx $\frac{1}{16}$–$\frac{1}{8}$ in. long, divided to the base; sepals 4–5, lanceolate, very

acute. Corolla white, deciduous, shorter than the calyx; tube urceolate; lobes 4–5, ovate-lanceolate. Filaments flattened, glabrous. Capsule membranous, nearly equalling the calyx, operculately dividing about the middle. Seeds numerous, trigonous, black when fully ripe. Fl. B. I. v. 3, p. 506; Wight, Icon. t. 2000; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 162.—Flowers: Aug.–Sept.

Rare. DECCAN: Rohe, near Poona, *Bhiva*!; Lingmala, Mahableshwar, *Woodrow*! —DISTRIB. India (Central and Western Himalaya, Central India, W. Peninsula); Tropical America, Australia.

ORDER LXXVI. MYRSINACEÆ.

Trees or shrubs sometimes climbing. Leaves alternate, simple, usually gland-dotted; stipules 0. Flowers small, often with resinous glands, regular, hermaphrodite or polygamo-dicœcious. Calyx free (in *Mœsa* more or less adnate to the ovary), 4–6 (usually 5) -fid or -partite; segments usually ciliate and persistent. Corolla usually gamopetalous, rotate (rarely campanulate or tubular); segments or petals 4–6 (very rarely 3 or 7), usually contorted or imbricate (rarely valvate). Stamens opposite the corolla-lobes and isomerous with them; filaments short (rarely elongate), free or more or less connate with one another; anthers attached at the back near the base, dehiscing by longitudinal slits (very rarely by pores). Ovary globose or ovoid, superior (in *Mœsa* ½-inferior), 1-celled, usually attenuated into the style; ovules few or many, on a free central usually globose placenta; style simple; stigma acute, truncate or capitate (rarely shortly lobed). Fruit usually pisiform, 1- or few- or rarely many-seeded, indehiscent (except in *Ægiceras*), often sub-baccate and colored, 1–many-seeded. Seeds usually globose, excavated at the base; albumen fleshy or horny, smooth or ruminate (0 in *Ægiceras*); embryo transverse.—DISTRIB. Throughout the warmer regions of both hemispheres, almost all tropical; genera 32; species 928 according to Mez, in Engl. Pflanzenreich, v. 4 (1902).

Fruit globose; seeds albuminous.	
Calyx thickened, enclosing the fruit; seeds numerous	1. MÆSA.
Calyx not thickened, free; seed solitary (rarely 2 in *Embelia*).	
Corolla-lobes imbricate.	
Flowers in axillary fascicles	2. MYRSINE.
Flowers in racemes or panicles	3. EMBELIA.
Corolla-lobes twisted	4. ARDISIA.
Fruit cylindric; seeds exalbuminous	5. ÆGICERAS.

1. MÆSA, Forsk.

Glabrous or pubescent shrubs sometimes more or less sarmentose; branches terete. Leaves entire, toothed, or serrate, usually pellucid-dotted. Inflorescence sometimes monstrous, the flowers replaced by densely imbricating bracteoles; flowers 2-bracteolate beneath the calyx, small, white, hermaphrodite or sometimes 1-sexual, in axillary racemes or panicles, pedicellate; pedicels bracteate at the base. Calyx-tube adnate to the ovary; lobes 5, persistent, imbricate. Corolla shortly campanulate; lobes 5, imbricate, rounded, with inflexed tips. Stamens 5, inserted on the corolla-tube; filaments short. Ovary partially adnate to the calyx; ovules numerous on a subglobose placenta; style short;

stigma small, capitate or shortly 3–5-lobed. Berry globose, of the size of a pepper-corn, usually apiculate by the persistent style, enclosed in the thickened persistent calyx, many-seeded. Seeds numerous, albuminous, angular.—DISTRIB. Throughout the Tropics except America; species 102 (according to Mez, in Engl. Pflanzenreich, v. 4).

1. **Mæsa indica,** *Wall. in Roxb. Fl. Ind. ed. Carey*, v. 2 (1824) p. 230 *in note.* A large much-branched shrub; twigs slender, glabrous, usually covered with numerous small lenticels. Leaves 3–6 by 1½–3 in., ovate-oblong or elliptic-lanceolate, acute or acuminate, regularly or irregularly serrate-dentate, thin, glabrous and shining above, glabrous or with a few scattered hairs on the nerves beneath, base usually acute; main nerves 8–10 pairs, conspicuous beneath; petiole ½–1 in. long, glabrous or slightly hairy. Flowers very small, faintly fragrant, numerous, in compound, panicled, usually glabrous racemes; pedicels filiform, $\frac{1}{20}$–$\frac{1}{12}$ in. long; bract 1 below the pedicel, narrowly ovate, acute, glabrous; bracteoles 2, about $\frac{1}{20}$ in. long, narrowly ovate, acute, not ciliate. Calyx $\frac{1}{16}$ in. long, divided rather more than ½-way down; lobes rotund-ovate, obtuse, not or sometimes faintly ciliate, glabrous on the back, marked with dark lines; tube enlarged in fruit, enclosing the berry, rugose and obscurely ribbed outside. Corolla white, $\frac{1}{10}$ in. long, marked with colored lines, divided to the middle; lobes rotund-ovate, somewhat abruptly and shortly contracted at the very base and with slightly crenulate margins, spreading. Berry globose, creamy-white, about ⅛ in. in diam., covered almost to the apex by the persistent calyx and tipped with the short style. Seeds black. Fl. B. I. v. 3, p. 509; Grah. Cat. p. 105; Dalz. & Gibs. p. 136; Bedd. For. Man. in Flor. Sylvat. p. cxxxvii, t. 18, fig. 4; Trim. Fl. Ceyl. v. 3, p. 67; Talb. Trees, Bomb. ed. 2, p. 202; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Mez, in Engl. Pflanzenreich, v. 4 (1902) p. 29; Watt, Dict. Econ. Prod. v. 5, p. 106.—Flowers: Nov.-Jan. VERN. *Atki.*

Common along the Ghâts, *Dalzell & Gibson.* DECCAN: Mahableshwar hills, *Law!*; *Cooke!*; hills about Pár, *Graham*; Korinda near Khandala, *Arbuckle* ex *Graham.* S. M. COUNTRY: Párva Ghát, *Ritchie*, 1827! KANARA: abundant in the evergreen forests of the Sirsi and Siddapur talukas of N. Kanara, *Talbot.*—DISTRIB. Throughout India; Malaya, Africa.

Graham and Dalzell both state that the fruit is used to poison fish, and Talbot says that the leaves are used in curries in N. Kanara.

VAR. *dubia.* Tips of the young branches, main nerves of the leaves beneath, petioles, rhachis of the inflorescence, bracts and bracteoles clothed (more or less densely) with usually rust-colored hairs; calyx-lobes ciliate and, as well as the corolla-lobes, strongly lineate. *Mæsa dubia* (sp.), Wall. in Roxb. Fl. Ind. ed. Carey, v. 2 (1824) p. 235; C. B. Clarke, in Hook. f. Fl. B. I. v. 3, p. 510; Grah. Cat. p. 105; Talb. Trees, Bomb. ed. 2, p. 202; Mez. in Engl. Pflanzenreich, v. 4 (1902) p. 39. *M. indica*, var., Bedd. For. Man. in Flor. Sylvat. t. 18, fig. 4, n. 1 *only.*

Except the hairiness I can find no appreciable difference between this and *M. indica*, and it seems doubtful if it deserves even the rank of a variety. The difference in the length of the filaments relied on by Mez (Engl. Pflanzenreich, v. 4, p. 20) as a distinctive character is not at all a constant one. I have found the anthers in both plants sessile as well as

stipitate, and the length of the filament would often seem to be a question of age. Beddome (For. Man. in Flor. Sylvat. p. cxxxvii) in his description of *M. indica* says that some forms are quite glabrous, others densely pubescent, particularly on the under surface of the leaves and the petioles. It does not seem unlikely that the difference in hairiness may be due to climatic conditions, as the specimens of *M. dubia* appear to be chiefly from the plains of the Konkan and Kanara, while those of *M. indica* are from the hills.

KONKAN: *Law!*, *Stocks!*, *Talbot.* KANARA: *Talbot, Law!*; Kasarli, *Ritchie*, 1827!

Mæsa velutina, Mez, in Engl. Pflanzenreich, v. 4, p. 35. Of this I have seen no specimens; there are none in Herb. Kew. According to Mez (*l. c.*) the plant grows in the Presidency of Bombay, from which specimens from Dr. Gibson are in Herb. Leiden. Mez describes the fruit as subacute at the apex; otherwise the description would apply to *Mæsa indica*, var. *dubia*.

2. **MYRSINE,** Linn.

Trees or shrubs usually glabrous. Leaves coriaceous, usually entire. Flowers small, sessile or shortly pedicellate, polygamous or often dioecious, in sessile or shortly pedunculate axillary fascicles; bracts often imbricate, deciduous. Calyx small, 4–5-fid, persistent. Corolla 4–5-partite or -petalled, white; segments spreading, imbricate (rarely valvate), not contorted in bud, resinous-dotted. Stamens 4–5, inserted at the base of the corolla-lobes; anthers short. Ovary free, globose or ovoid, 1-celled; ovules few or many, immersed in the placenta; style short or almost obsolete; stigmas 2–5, erect or spreading, sometimes sessile. Fruit small, globose, dry or subfleshy, red or purple. Seed solitary; albumen more or less pitted, scarcely ruminate; embryo elongate, cylindric, often curved or sigmoid.

The genus has been divided by Mez [Engl. Pflanzenreich, v. 4 (1902)] into 2 genera, viz. *Myrsine* (4 species) in which the filaments and styles are distinctly visible, and *Rapanea* (136 species) in which the anthers and stigmas are sessile. I have adhered to the genus as defined in the 'Genera Plantarum' of Bentham and Hooker.—DISTRIB. Chiefly tropical; species 140 in the combined genera of Mez.

1. **Myrsine capitellata,** *Wall. in Roxb. Fl. Ind. ed. Carey*, v. 2 (1824) p. 295. A shrub or small much-branched tree; branchlets thick, dark-brown, marked with the scars of fallen leaves; young parts glabrous. Leaves coriaceous, 3–6 by $\frac{3}{4}$–$2\frac{1}{4}$ in., elliptic-lanceolate or narrowly obovate, subacute, entire, glabrous, pellucido-punctate, reticulately veined, narrowed at the base; petioles $\frac{3}{8}$–$\frac{1}{2}$ in. long. Flowers small, sessile or on slender glabrous pedicels $\frac{1}{12}$–$\frac{1}{8}$ in. long, in dense rounded fascicles, on nodules in the axils of fallen leaves; bracts ovate, imbricate. Calyx resinous-dotted, 5-toothed; teeth triangular, about $\frac{1}{20}$ in. long, minutely gland-ciliate. Corolla divided almost to the base; lobes $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovate-oblong, subacute, resinous-dotted and with minutely ciliate margins, spreading or reflexed. Anthers very large, sessile or nearly so in the ♀ flowers, on short filaments in the ♂ flowers. Fruit globose, $\frac{1}{6}$–$\frac{1}{4}$ in. in diam., purple and shining when ripe. Fl. B. I. v. 3, p. 512; Wight, Icon. t. 1211; Bedd. Flor. Sylvat. t. 234; Trim. Fl. Ceyl. v. 3, p. 68; Talb. Trees, Bomb. ed. 2, p. 202; Woodr. in

Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 5, p. 315. *Rapanea capitellata*, Mez, in Engl. Pflanzenreich, v. 4 (1902) p. 356.—Flowers: Oct.–Dec.

Rare. KANARA: evergreen forests of N. Kanara from Ainshi southwards, not common, *Talbot*; Santaveri, *Woodrow*!—DISTRIB. India (Nipal, Bhotan, Assam, Khasia hills, W. Peninsula); Ava, Ceylon.

3. **EMBELIA,** Burm.

Large shrubs usually climbing. Leaves alternate, entire or toothed; petiole often margined. Flowers small, whitish, hermaphrodite or polygamo-dioecious, in axillary or terminal simple or compound racemes or panicles. Calyx free, persistent, 4–5-fid or -partite; lobes rounded or ovate. Petals 4–5, free or slightly cohering at the base, erecto-patent or reflexed, elliptic, imbricate (rarely contorted). Stamens 4–5; filaments more or less adnate to the petals, sometimes 0; anthers ovate-oblong. Ovary ovoid or globose (rarely conical-beaked); ovules few, inserted on a subglobose placenta; style short; stigma capitellate. Fruit small, globose, 1 (rarely 2) -seeded. Seeds globose, excavated at the base; albumen pitted or subruminate; embryo curved, transverse.—DISTRIB. Tropical Asia, Africa and Australia, New Caledonia and the Sandwich Islands; species 92, according to Mez (Engl. Pflanzenreich, v. 4, 1902).

Flowers 5-merous.	
Leaves oblong-lanceolate; inflorescence terminal or in the upper axils	1. *E. Ribes.*
Leaves broadly elliptic; inflorescence axillary	2. *E. robusta.*
Flowers 4-merous	3. *E. viridiflora.*

1. **Embelia Ribes,** *Burm. Fl. Ind.* (1768) p. 62, t. 23. A large scandent shrub; branches long, slender, flexible, terete, with long internodes, the bark studded with lenticels. Leaves coriaceous, 2–3½ by ¾–1½ in., elliptic or elliptic-lanceolate, shortly and obtusely acuminate, entire, glabrous on both sides, shining above, paler and somewhat silvery beneath, the whole surface covered with scattered minute reddish sunken glands (conspicuous in the young leaves), base rounded or acute; main nerves numerous, slender (more or less obscure in fresh specimens); petioles ¼–⅝ in. long, more or less margined, glabrous. Flowers 5-merous, numerous, small, in lax panicled racemes which are terminal and from the upper axils; branches of the panicle often 3–4 in. long with more or less glandular-pubescent rhachises; pedicels $\frac{1}{16}$–$\frac{1}{12}$ in. long, glandular-pubescent; bracts minute, setaceous, deciduous. Calyx about $\frac{1}{20}$ in. long; sepals connate about ⅓ of the way up, the teeth 5, broadly triangular-ovate, ciliate. Petals 5, greenish-yellow, free, ⅛ in. long, elliptic, subobtuse, pubescent on both sides. Stamens 5, shorter than the petals, erect; filaments inserted a little below the middle of the petals. Fruit globose, ⅛–¼ in. in diam., smooth, succulent, black when ripe, like a pepper-corn when dried, tipped with the persistent style. Fl. B. I. v. 3, p. 513; Grah. Cat. p. 104; Dalz. & Gibs. p. 137; Trim. Fl. Ceyl. v. 3, p. 69; Talb. Trees, Bomb. ed. 2, p. 203; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 3, p. 242; Mez, in Engl. Pflanzenreich, v. 4 (1902) p. 303. *Embelia*

glandulifera, Wight, Icon. v. 4, p. 7; Dalz. & Gibs. p. 137.—Flowers: Feb. VERN. *Vaivarang*; *Kárkanni*.

Hilly parts of the Presidency. KONKAN: *Law*!; Ghâts, *Dalzell & Gibson, Woodrow.* DECCAN: Mahableshwar, *Graham, Cooke*! KANARA: evergreen forests near the Gairsoppa Ghât, *Talbot.*—DISTRIB. Throughout India; Ceylon, Malaya, S. China.

The fruit is sold in the bazaars and used to adulterate black pepper which it much resembles.

2. **Embelia robusta,** *Roxb Hort. Beng.* (1814) p. 16. A rambling shrub or small tree; branches glabrous or the very young ones sometimes rusty-tomentose. Leaves 2½–4½ by 1½–2¼ in., broadly elliptic, suddenly and shortly acuminate, gland-dotted, the margins entire or sometimes irregularly toothed, glabrous above, paler, often reddish beneath and more or less rusty-pubescent on the nerves, base rounded or subacute; main nerves slender, conspicuous beneath, with reticulate veins between; petioles ⅜–¾ in. long, rusty-pubescent. Flowers 5-merous, pale greenish-yellow, in axillary rusty-puberulous racemes shorter than the leaves; pedicels ⅛ in. long; bracts minute, subulate. Calyx ⅙ in. long; sepals shortly connate at the base, ovate, subacute, gland-dotted and with minutely-glandular margins. Petals free or nearly so, ⅛ in. long, elliptic-oblong, subacute, puberulous and usually with a few glands outside, densely papillose inside. Filaments in the male flowers ⅕ in. long; anthers not apiculate. Fruit globose, apiculate with the style, red when ripe. Fl. B. I. v. 3, p. 515; Bedd. For. Man. in Flor. Sylvat. p. cxxxvii, t. 19, fig. 2; Trim. Fl. Ceyl. v. 3, p. 70; Talb. Trees, Bomb. ed. 2, p. 203; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Mez, in Engl. Pflanzenreich, v. 4 (1902) p. 319; Watt, Dict. Econ. Prod. v. 3, p. 243. *Embelia Tsjeriam-cottam*, A. DC. in Trans. Linn. Soc. v. 17 (1837) p. 131; Grah. Cat. p. 104; Wight, Icon. t. 1209. *E. Basaal*, A. DC. in Trans. Linn. Soc. l. c.; Dalz. & Gibs. p. 136.—Flowers: Apr.–July. VERN. *A'mbati.*

KONKAN: Vingorla, *Stocks*!, *Dalzell*!; Pál jungles, *Gangaram*! DECCAN: hills near Kárli, *Woodrow*!; Kartriz Ghât, *Woodrow.* S. M. COUNTRY: Belgaum, *Ritchie*, 1102!

The fruit is used in medicine and also as an adulterant for black pepper. See Watt, Dict. Econ. Prod. l. c.—DISTRIB. Throughout the greater part of India; Ceylon.

3. **Embelia viridiflora,** *Scheff. Myrs. Arch. Ind.* (1867) p. 45. An extensive climber; branches much warted. Leaves 3–5 by 1½–2½ in., elliptic, acute, obtuse or acuminate, glabrous, punctate on both sides with opaque dots, margins narrowly recurved, base acute or rounded; main nerves numerous, slender, uniting within the margin, with reticulate veins between; petioles ½–⅞ in. long, channelled. Flowers 4-merous, in short cylindric racemes from the axils of fallen leaves; pedicels 1/16–1/10 in. long; bracts broadly ovate, acuminate, about 1/20 in. long, often with 2 small, rather obscure lateral teeth. Calyx divided nearly to the base; segments triangular-ovate, acute, gland-dotted, 1/20–1/16 in. long, with minutely glandular-ciliate margins. Petals free, ⅛–⅙ in. long, elliptic-oblong or slightly obovate, obtuse, conspicuously gland-dotted outside, gland-dotted and papillose inside. Stamens at first scarcely exceeding the petals, afterwards elongating; filaments connate with the petals to about ⅓ the length of the petals from the base; anthers oblong, rounded or slightly

apiculate at the apex, sometimes glandular at the back with dark-colored glands. Fruit globose, ¼ in. in diam., tipped with the persistent style, smooth, red when ripe. Fl. B. I. v. 3, p. 516; Trim. Fl. Ceyl. v. 3, p. 70; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Mez, in Engl. Pflanzenreich, v. 4 (1902) p. 327. *Embelia basaal*, Mez, in Engl. Pflanzenreich, v. 4 (1902) p. 328, fig. 54 (*not* of A. DC.). *Embelia tetrandra*, Grah. Cat. Bo. Pl. p. 105. *Samara Rheedei*, Wight, Icon. t. 1591.—Flowers: Dec.–Jan. VERN. *A'mbat.*

Confined to the higher hills of the Presidency. DECCAN: Mahableshwar, very common, *Cooke*!, *Graham*. KANARA: *Law*!—DISTRIB. India (hills of the W. Peninsula); Ceylon, Malaya.

4. **ARDISIA,** Swartz.

Shrubs or small trees. Leaves alternate, sessile or petiolate, usually entire. Flowers usually hermaphrodite, white or rosy, in terminal or terminal and axillary (rarely altogether axillary) panicles, umbels, or corymbs. Calyx 5 (rarely 4) -lobed or -partite; lobes contorted or imbricate. Corolla rotate, 5 (rarely 4–6) -partite; segments short or long, twisted to the right. Stamens 5, attached to the base of the corolla (rarely higher up); filaments short or almost 0, free, rarely elongate; anthers elongate, usually sagittate, acute, acuminate or apiculate, rarely obtuse, dehiscing introrsely and longitudinally. Ovary ovoid, pyramidal or subglobose; ovules few or many, immersed in a globose placenta; style short or elongate; stigma minute, punctiform. Fruit globose or subglobose, usually apiculate with the persistent style; endocarp crustaceous or bony. Seed solitary, globose; albumen usually horny; embryo cylindric, transverse.—DISTRIB. Abundant in Tropical Asia, rare in Tropical Africa, America, and Australia; species 235 according to Mez [Engl. Pflanzenreich, v. 4 (1902)].

Flowers ¾ in. across; corolla pink, spotted; fruit black ..... 1. *A. solanacea.*
Flowers ½ in. across; corolla white, not spotted; fruit red ..... 2. *A. parviflora.*

1. **Ardisia solanacea,** *Roxb. Cor. Pl.* v. 1 (1795) p. 27, t. 27. A large much-branched shrub or tree, sometimes 30 ft. high (*Talbot*); branchlets stout, glabrous, marked with the scars of fallen leaves. Leaves scattered, 4–6 by 2–2¾ in., subcoriaceous, obovate or lanceolate, obtuse or shortly subacuminate, often twisted at the apex, glabrous, punctulate; main nerves slender, numerous, with obscure reticulate veins between; base gradually tapering and decurrent on the petiole; petioles ¼–½ in. long, stout, channelled. Flowers in axillary (often from the axils of reduced leaves) corymbs, shorter than the leaves; pedicels ½–1 in. long, slightly thickened at the apex; buds ¼–⅓ in. long. Calyx divided to the base; sepals imbricate, ⅛ in. long, rotund-ovate, densely gland-dotted and with membranous ciliate margins. Corolla rose-colored, divided almost to the base; petals ⅜ in. long, ovate-elliptic, acute, marked with dark lines. Stamens shorter than the petals; filaments very short, attached to the base of the petals; anthers large, ⅕ in. long, lanceolate, acute. Ovary ovoid, glabrous. Fruit depressed-globose, ¼ in. in diam., purple-black. Willd. Sp. Pl. v. 1 (1797) p. 1063; Bot. Mag. v. 40 (1814) t. 1677; Roxb. Hort. Beng. (1814) p. 16; Fl. Ind. v. 1 (1832) p. 580; Wall. Cat. (1828) 2283, A–K; Grah. Cat. p. 104; Mez, in Engl. Pflanzenreich, v. 4 (1902) p. 132 and p. 128,

fig. 20 F–K. *Ardisia humilis*, A. DC. in Trans. Linn. Soc. v. 17 (1837) p. 118 (*not* of Vahl); Wight, Icon. t. 1212; Dalz. & Gibs. p. 137; C. B. Clarke, in Hook. f. Fl. B. I. v. 3, p. 529 (exclud. some syn.); Talb. Trees, Bomb. ed. 2, p. 204; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 1, p. 290. *A. elliptica*, Bedd. For. Man. in Flor. Sylvat. p. cxxxviii (*not* of Thunb.).—Flowers: Apr.–June. VERN. *Dikna*; *Buyéli*.

KONKAN: common on the Ghâts to the South, *Dalzell & Gibson*; Amboli Ghât, *Cooke*!; Goa districts, *Dalzell*! S. M. COUNTRY: Castlerock, *Bhiva*! KANARA: evergreen forests, usually on the banks of streams, common, *Talbot*; Tinai (N. Kanara), *Ritchie*!; Waguli, *Ritchie*!—DISTRIB. Throughout India, China, Malaya.

Note.—A. De Candolle (Trans. Linn. Soc. l. c.) makes this conspecific with *Ardisia humilis*, Vahl. Vahl, in his description (Symb. v. 3, p. 40), gives salt-marshes in Siam, Malacca, and Ceylon as the habitat of *A. humilis*, and further describes the inflorescence as being *terminal* in compound racemes, with a corolla-tube almost as long as the calyx. *A. solanacea*, Roxb., is common throughout India, with flowers in *axillary* corymbs and a very short corolla-tube (Mez, in Engl. Pflanzenreich, v. 4, p. 128, fig. 20). Beddome who, while recognizing the identity of the plant with *A. solanacea*, Roxb., has adopted Thunberg's name *A. elliptica* (Bedd. For. Man. p. cxxxviii), is quite clear as to the existence of *A. humilis* as a separate species. In For. Man. p. cxxxix he says that *A. humilis* is an undershrub found in the Madras Presidency and Ceylon. It seems therefore justifiable to regard the *large* shrub or small tree with flowers in axillary corymbs, which is common throughout India, as *A. solanacea*, Roxb., and the *small* shrub, with flowers in terminal panicles, which is found near the sea-coast in Madras and Ceylon, as *A. humilis*, Vahl.

2. **Ardisia parviflora**, *Talbot, Trees & Shrubs, Bomb.* ed. 2 (1902) p. 204. A small, erect, branched shrub. Leaves coriaceous, 3–4½ by 1–1¾ in., obovate, acute, distantly crenate, pellucido-punctate, base cuneate; petioles ¼ in. long. Flowers small, ⅜–½ in. across, in simple pedunculate axillary or terminal umbels about ½ as long as the leaves. Corolla small, white, not pink nor spotted. Fruit size of a pea, globose, not striate, red when ripe.—Flowers in the rainy season.

KANARA: in the evergreen scrub jungles near the coast in the Karwar subdivision of N. Kanara, *Talbot*.

I have seen no specimens of this plant; there are none in Herb. Kew. But that Mr. Talbot describes the leaves as crenate and the corolla as white without spots, it might be the true *Ardisia humilis* of Vahl.

5. ÆGICERAS, Gærtn.

Maritime shrubs or small trees; branches cylindric. Leaves alternate, quite entire, glabrous. Flowers large for the Order, white, pedicellate, in terminal leaf-opposed or axillary sessile or subsessile (rarely shortly pedunculate) umbels; bracts 0. Flowers hermaphrodite, 5-merous. Calyx 5-partite; segments obliquely imbricate, twisted towards the right in bud. Stamens 5, on the corolla-tube; anthers versatile, attached at the middle or a little below the middle of the back, dehiscing longitudinally, cells transversely septate. Ovary glabrous, fusiform, narrowed into a slender style; ovules many, immersed in a globose placenta; stigma punctiform. Fruit cylindric, curved, acute, coriaceous, 1-seeded, at length dehiscing longitudinally. Seed conform to the fruit, elongate, erect, germinating within the pericarp; albumen 0; embryo cylindric curved, thick; cotyledons short; radicle short, inferior.—DISTRIB. Muddy sea-coasts and saltwater creeks of Tropical Asia and Australia, growing along with the mangroves; species 2 according to

Mez [Engl. Pflanzenreich, v. 4 (1902) p. 55], who rehabilitates the species *Æ. floridum*, Rœm. & Schultz, which is included under *Æ. majus* by Mr. C. B. Clarke in Hook. f. Fl. B. I. v. 3, p. 533.

1. **Ægiceras majus,** *Gærtn. Fruct.* v. 1 (1788) p. 216, t. 46. A shrub or small tree 5–20 ft. high, with milky juice; branches glabrous. Leaves 2–3¼ by 1¼–1⅝ in., obovate, obtuse, sometimes retuse, glabrous on both sides, pale-green above, somewhat glaucous beneath, base cuneate; midnerve strong, the lateral nerves numerous, slender; petiole very short, stout. Flowers fragrant, in sessile or shortly pedunculate terminal, leaf-opposed or rarely axillary umbels; pedicels ¼–½ in. long, glabrous. Calyx ¼ in. long, persistent, glabrous, divided nearly to the base; segments broadly oblong, obtuse, much imbricate, the upper part membranous. Corolla ½ in. long, thick, white; tube ⅕ in. long; lobes triangular-oblong, very acute, reflexed, twisted in bud. Filaments densely woolly at the base, exserted. Fruit 1–2½ in. long, falcately curved, very sharply pointed, closely surrounded at the base by the enlarged persistent cup-like calyx, glabrous, cinnamon-brown. Fl. B. I. v. 3, p. 533; Dalz. & Gibs. p. 137; Bedd. For. Man. in Flor. Sylvat. p. cxxxix, t. 19, fig. 3; Aitch. Pb. & Sind Pl. p. 85; Trim. Fl. Ceyl. v. 3, p. 74; Talb. Trees, Bomb. ed. 2, p. 204; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prodr. v. 1, p. 116. *Ægiceras fragrans*, Kœn. Ann. Bot. v. 1, p. 129, t. 3; Grah. Cat. p. 104. *Æ. corniculata*, Blanco, Fl. Filip. ed. 1 (1837) p. 79; Mez, in Engl. Pflanzenreich, v. 4 (1902) p. 55.—Flowers: Feb. VERN. *Kájlá.*

KONKAN: sea-coast near Bombay, *Law!*, *Cooke!*; Mumbra near Tanna, *Cooke!*, *Woodrow!*; in salt-marshes in company with the different species of mangrove, *Dalzell & Gibson.* KANARA: sea-coast and along creeks, *Talbot.* SIND: mud-forests, *Stocks*, 373!; Karachi, *Ritchie*, 456!

ORDER LXXVII. SAPOTACEÆ.

Trees, less commonly shrubs, with milky juice. Leaves alternate, usually coriaceous, entire; stipules 0, or rarely small and caducous. Flowers small, regular, usually hermaphrodite, axillary; pedicels minutely bracteate or altogether ebracteate; bracteoles beneath the calyx rare. Calyx-lobes 4–8, deep, imbricate or in 2 rows with the outer valvate, persistent. Corolla gamopetalous; tube short, campanulate or urceolate (rarely elongate); lobes as many or 2–4 times as many as the calyx-lobes. Stamens inserted on the corolla-tube, as many as the corolla-lobes and opposite to them, or 2–3 times as many, 1–3-seriate; filaments usually short; anthers oblong-lanceolate, the connective often produced beyond the cells. Staminodes when present alternating with the stamens. Ovary superior, sessile, 2–8-celled; ovules solitary in each cell; style shortly conical or elongate-subulate, glabrous; stigma usually pun*c*tiform. Berry indehiscent, 1–8-seeded. Seeds ellipsoid or if more than 1 often compressed, albuminous or not; hilum long, conspicuous; testa smooth shining; radicle inferior.—DISTRIB. Tropics of the world; genera about 24; species about 320.

Calyx-segments 1-seriate.
  Calyx-segments 5–6; stamens 5–6.
    Staminodes 0 ..... 1. CHRYSOPHYLLUM.
    Staminodes 5 ..... 2. SIDEROXYLON.

Calyx-segments 2-seriate.
  Calyx-segments 4.
    Stamens 8 ..... 3. ISONANDRA.
    Stamens 12 or more ..... 4. BASSIA.
  Calyx-segments 6-8.
    Staminodes 0 ..... 5. PALAQUIUM.
    Staminodes 6 or 8 ..... 6. MIMUSOPS.

1. **CHRYSOPHYLLUM,** Linn.

Trees with milky juice. Leaves coriaceous; stipules 0. Flowers small, in axillary fascicles, pedicellate or subsessile. Calyx 5-6-partite; lobes subequal, imbricate. Corolla-lobes 5-6, entire, imbricate. Stamens as many as the corolla-lobes and opposite to them, attached to the tube or the base of the lobes; filaments subulate or filiform; anthers ovate or triangular; staminodes 0. Ovary villous, 5-6 (rarely 7-10)-celled; style glabrous, short or long. Berry fleshy or coriaceous, globose. Seeds 5-6 (or fewer); testa coriaceous, dull or shining; hilum elongate. —DISTRIB. Chiefly Tropical American, a few species in Africa, Asia, and Australia; species about 60.

1. **Chrysophyllum Roxburghii,** *G. Don, Gen. Syst.* v. 4 (1837) p. 33. A slender tree reaching 40-50 ft. high; branches horizontal; bark smooth, grey; young parts clothed with fulvous pubescence. Leaves 3-5 by 1¼-2 in., distichously spreading, oblong-lanceolate, caudate-acuminate, glabrous, shining; main nerves very numerous, nearly perpendicular to the midrib, fine, conspicuous, uniting within the margin, so close as to give the leaves a striate appearance; petioles ¼ in. long. Flowers numerous, in rounded clusters; pedicels ⅛ in. long, recurved. Calyx $\frac{1}{10}$ in. long, broadly campanulate; lobes equalling the tube, rounded, densely ciliate. Stamens included. Ovary densely hairy; style short, conical, glabrous. Fruit 1-1½ in. in diam., globose, obscurely 5-6-angled (strongly so when dry), tomentose when young, afterwards smooth, yellowish-green, edible. Seeds 5-6, ellipsoid, compressed, ½-¾ by ¼-⅜ in., the inner edge straight, the outer curved, highly polished, very hard, brownish-yellow. Fl. B. I. v. 3, p. 535; Dalz. & Gibs. p. 138; Talb. Trees, Bomb. ed. 2, p. 205; Watt, Dict. Econ. Prod. v. 2, p. 273. *Chrysophyllum acuminatum*, Roxb. Fl. Ind. v. 1, p. 599; Grah. Cat. p. 105.—Flowers: Apr.-May. VERN. *Tarsi.*

KONKAN: *Stocks*!; evergreen forests, *Talbot*. S. M. COUNTRY: Chorla Ghát (Belgaum districts), *Ritchie*!, *Stocks*!, *Dalzell & Gibson*. KANARA: evergreen forests of N. Kanara, common, *Talbot*.

The fruit, which is called the *Star Apple*, is pulpy and glutinous, and is eaten by the natives though not very palatable.—DISTRIB. India (Assam, Khasia, Silhet, W. Peninsula); Ceylon, Malacca.

Chrysophyllum Cainito, Linn. Sp. Pl. (1753) p. 192. A tree, a native of the West Indian islands, occasionally though rarely cultivated in India. A tree is to be found at Khandala in the Poona districts. Leaves 3-5 by 1½-2½ in., elliptic-oblong, obtuse or shortly acuminate, glabrous and shining above, densely silky with golden or rufous pubescence beneath, base shortly acute; main nerves numerous, slender, nearly perpendicular to the strong midnerve; petioles ¼-½ in. long.

Pedicels slender, fascicled, ¼ in. long, rufous-tomentose. Corolla campanulate, silky, 2–3 times as long as the calyx. Ovary 7–10-celled; stigma 7–10-radiate. Fruit spherical, as large as a small apple, edible. Griesbach, Fl. Brit. W. Ind. Isl. p. 398; Mart. Fl. Bras. v. 7, p. 94; Woodr. Gard. in Ind. ed. 5, p. 372. *C. Roxburghii*, Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163 (*not* of G. Don).—Flowers: Aug.

2. **SIDEROXYLON,** Linn.

Trees (rarely shrubs). Leaves coriaceous, alternate; stipules 0. Flowers small, in axillary fascicles, sessile or pedicellate. Calyx-segments 5 (rarely 6), much imbricate, subequal. Corolla campanulate; lobes 5 (rarely 6), shorter or longer than the tube, imbricate. Stamens 5 (rarely 6), attached to the tube or the base of the corolla-lobes and opposite to them; filaments short or elongate; anthers ovate or lanceolate; staminodes 5, lanceolate. Ovary usually villous, 5 (rarely 2–4)-celled; style short or long; stigma small (rarely sublobate). Berry ovoid or globose. Seeds usually solitary (sometimes 2–5); testa coriaceous or hard and shining; albumen fleshy; cotyledons flat, broad, foliaceous or fleshy; radicle short.—Distrib. Chiefly tropical, a few extra-tropical; species about 60.

1. **Sideroxylon tomentosum,** *Roxb. Cor. Pl.* v. 1 (1795) p. 28, t. 28. A small or moderate-sized tree with cracked bark; lateral twigs often becoming sharp spines; young parts pubescent or tomentose. Leaves 2–4 by 1–2 in., numerous, subcoriaceous, elliptic or elliptic-obovate, subacute or sometimes rounded, rarely retuse at the apex, tomentose when young, glabrous when mature, dark-green above, paler beneath, base acute; main nerves 10–12 pairs; petioles ¼ in. long, pubescent. Flowers small, slightly fragrant, in rounded axillary clusters; pedicels ¼ in. long, drooping, fulvous-pubescent. Calyx campanulate, ¼ in. long, fulvous-pubescent; lobes 5, acute, longer than the tube, much imbricate. Corolla white, ¼–⅓ in. long; segments 5, narrowly lanceolate, very acute. Staminodes linear-lanceolate, hairy. Ovary densely hairy; style exserted about ⅜ in. beyond the flower, glabrous. Berry ¾–1 by ½–⅔ in., pubescent when young, afterwards glabrous, yellowish-green. Seed usually solitary (sometimes 1–5), ½ in. long, smooth, polished and shining. Fl. B. I. v. 3, p. 538; Grah. Cat. p. 105; Trim. Fl. Ceyl. v. 3, p. 77; Talb. Trees, Bomb. ed. 2, p. 206; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 6, part 2, p. 687. *Sapota tomentosa*, A. DC. Prodr. v. 8, p. 175; Dalz. & Gibs. p. 139. *Sapota elengoides*, A. DC. Prodr. v. 8, p. 176; Wight, Icon. t. 1218. *Achras elengoides*, Bedd. Flor. Sylvat. t. 235. *Achras tomentosa*, Bedd. For. Man. in Flor. Sylvat. p. cxlii.—Flowers: Oct.–Jan. Vern. *Kunvalá*; *Kumbal*.

A common tree throughout the Presidency. Konkan: *Stocks!*, *Law!*, *Graham*; Devale (Ratnagiri districts), *Kanitkar!*; Matheran, *Cooke!*, *H. M. Birdwood*. Deccan: Khandala, *Cooke!*; Mahableshwar, *Woodrow!*; bottom of Rotunda Ghát, below Mahableshwar, *Graham*. S. M. Country: Rámghát, *Ritchie*, 1104!; Belgaum (south), *Ritchie*, 1104! Kanara: evergreen forests of N. Kanara, common, *Talbot*.—Distrib. India (W. Peninsula); Ceylon, Pegu, Martaban (*fide* Kurz).

3. **ISONANDRA,** Wight.

Trees with milky juice. Leaves coriaceous with prominent primary nerves. Flowers small, in axillary clusters, subsessile or shortly pedicellate. Calyx-segments 4, 2-seriate. Corolla deeply 4-fid; lobes broad, imbricate. Stamens 8, subequal, attached at the base of the corolla, 1-seriate; filaments erect; anthers oblong-lanceolate; staminodes 0. Ovary hispid, 4-celled; style subulate. Berry ellipsoid. Seed usually solitary; testa crustaceous, shining; hilum lateral; albumen fleshy; cotyledons flat.—DISTRIB. India (W. Peninsula), Ceylon; species 6.

1. **Isonandra Candolleana,** *Wight, Icon.* t. 1220. Leaves 2–3½ by 1–1½ in., obovate-oblong, bluntly acuminate, glabrous on both sides. Flowers in rounded nearly sessile fascicles with small bracts at their base. Calyx ⅛ in. long, divided almost to the base; segments 4, broadly ovate, very unequal, the exterior much larger, hairy and ciliate. Corolla deeply 4-partite; lobes obovate-oblong, emarginate, longer than the tube. Stamens much shorter than the corolla-lobes; anthers pubescent at the apex. Ovary densely hairy; style much exserted. Berry ¾ by ¼ in. Fl. B. I. v. 3, p. 539; Dalz. & Gibs. p. 139; Talb. Trees, Bomb. ed. 2, p. 206.—Flowers: Mar.–May.

On the Ghâts, not uncommon, *Dalzell & Gibson.*

This species is included on the authority of Dalzell & Gibson (*l. c.*). I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew. Woodrow does not include the plant in his list, and Talbot has never seen it nor have any of the Poona plant-collectors found it. Dalzell & Gibson say that it is *not uncommon*, but as it has not been met with by any other botanists, I think its existence in the Bombay Presidency more than doubtful.—DISTRIB. Nilghiri mountains.

Isonandra Stocksii, C. B. Clarke, in Hook. f. Fl. B. I. v. 3, p. 539, is stated in the Fl. B. I. to occur in the Konkan, but it has never, so far as I know, been found there by any botanists. Neither Talbot nor Woodrow have seen it. There are 2 specimens in Herb. Kew., the tickets on which are *printed* ones on which appear the words "Hab. Malabar, Concan &c. Coll. Stocks, Law &c."

There is therefore no certainty as to the locality from which these specimens came, and they are not authenticated by the signatures of either Law or Stocks.

4. **BASSIA,** Kœnig ex Linn.

Trees with milky juice. Leaves coriaceous, clustered near the ends of the branches; stipules caducous. Flowers fascicled, crowded near the apices of the branches among the leaves, or from the axils of fallen leaves, pedicellate, often nodding. Calyx-segments 4, much imbricate, 2-seriate, the 2 outer enclosing the 2 inner. Corolla campanulate; tube broad; lobes 6–12, erect, subcontorted in bud. Stamens at least twice as many as the corolla-lobes, 12–40 (usually 16–20); filaments usually short; anthers lanceolate, acute, the connective often produced; staminodes 0. Ovary usually villous, 4–12-celled; style subulate, often elongate. Berry globose or ovoid, fleshy, 1–3 (rarely 4–5) -seeded. Seeds ellipsoid, more or less compressed; testa crustaceous, shining; hilum long, oblong or linear; albumen 0; cotyledons thick, fleshy; radicle very short.—DISTRIB. East Indies, Ceylon, Malayan Archipelago; species 30.

Anthers 20–30 in 3 series..... 1. *B. latifolia.*
Anthers 16–20 in 2 series.
Corolla-tube glabrous inside and outside; ovary hairy; fruit hairy when young..... 2. *B. longifolia.*
Corolla-tube hairy inside and outside; ovary glabrous; young fruit glabrous..... 3. *B. malabarica.*

Note.—The genus *Bassia* was established by Kœnig (Linn. Mantiss. p. 555). In his description of *Bassia longifolia*, Linnæus (Mantiss. p. 563) mentions that Kœnig (MS.) had given *Illipe* as a name of the plant. This name (*Illipe*) is the Tamil name of the tree and Kœnig evidently intended to explain that it was the *Illipe* of the inhabitants of the Malabar coast (*Illipe malabarorum*). F. von Mueller (Select Extra-Trop. Pl. ed. 5, p. 181) under the mistaken notion that Kœnig, notwithstanding his having already established the genus *Bassia*, had changed the name of that genus to *Illipe*, called *Bassia latifolia* by the name *Illipe latifolia*. Engler (Engl. & Prantl, Pflanzenf. v. 4, part 1, p. 133) follows Mueller in his mistake and gives the name *Illipe*, Kœnig, to the genus. Kœnig has nowhere published the genus as *Illipe*, and the only name possible to recognize for it is *Bassia*.

1. **Bassia latifolia,** *Roxb. Cor. Pl.* v. 1 (1795) p. 20, t. 19. A deciduous tree reaching 40–50 ft. high; bark thick, dark-colored, cracked, the inner bark red, milky; trunk short; branches numerous, spreading, forming a thick shady head (branched like an oak, *Dalz. & Gibs.*). Leaves clustered near the ends of the branches, 3–9 by 1½–4½ in., coriaceous, hard and firm, elliptic or elliptic-oblong, shortly acuminate, pubescent or tomentose when young, at length glabrous, base rounded or acute; main nerves 10–14 pairs, ¼–½ in. (or in large leaves ¾ in.) apart, with closely reticulate veins between; petioles 1–1½ in. long, at first pubescent, ultimately glabrous or nearly so; stipules ¼–⅜ in long, subulate, densely pubescent, very caducous. Flowers in dense fascicles near the ends of the branches, below the terminal leaf-bud; pedicels 1–1½ in. long, drooping, fulvous- or rusty-pubescent or -tomentose. Calyx ⅝ in. long, divided nearly to the base; segments ovate, subacute, rusty-tomentose, usually 4 (rarely 5), the two outer subvalvate and enclosing the others. Corolla cream-colored, rather more than ½ in. long; tube ⅓ in. long, fleshy, rugose when dry; lobes 7–14 (usually 8–9), ovate-lanceolate, acute, erect. Stamens 20–30 (usually 24–26); anthers in 3 series, acuminate, hairy at the back. Ovary hirsute; style 1 in. long or more, hairy at the base. Berry 1–2 in. long, fleshy, ovoid, greenish. Seeds 1–4. Fl. B. I. v. 3, p. 544; Grah. Cat. p. 107; Dalz. & Gibs. p. 139; Bedd. Flor. Sylvat. t. 41; Talb. Trees, Bomb. ed. 2, p. 206; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 1, p. 406.—Flowers: Jan.–Apr. VERN. *Mohá*; *Mhová.*

Throughout the Konkans, plentiful in Gujarat, *Graham, Dalzell & Gibson.* KONKAN: *Law!*; Malabar Hill (Bombay), *Graham*; Matheran Ghát, *H. M. Birdwood.* DECCAN: Khandala, *Woodrow!*; Peint Taluka, *Woodrow.* S. M. COUNTRY: Belgaum, *Ritchie,* $\frac{1105}{2}$; Padshapur, *Ritchie,* 1105! KANARA: forests of N. Kanara but nowhere abundant, *Talbot.*

A most useful tree. An oil is extracted from the kernels of the fruit, which is eaten and used for soap-making. The flowers are largely eaten either raw or cooked and a spirit is distilled from them from which a large revenue accrues to Government. For a full description see Watt, Dict. Econ. Prod. l. c.—DISTRIB. India (Central Provinces, Central India, Oude, Birma, W. Peninsula), cultivated and often self-sown.

2. **Bassia longifolia,** *Linn. Mantiss.* v. 2, App. (1771) p. 563. A large tree; branches numerous; bark thick, dark brown, scaly, the inner dark red, milky; young parts pinkish-white, silky-pubescent.

Leaves thin, clustered near the ends of the branches, 3–5 by 1–1¾ in., linear-lanceolate, acute, glabrous when mature, much tapered towards the base; main nerves 10–12 pairs; petioles ½–¾ in., long, slender; stipules ½ in. long, linear-subulate, hairy, caducous. Flowers appearing with the young leaves, in dense clusters near the ends of the branches below the leaves; pedicels 1½–2½ in. long, glabrous, erect at first, afterwards more or less drooping. Calyx ⅜–½ in. long, divided nearly to the base, densely rusty-pubescent; segments usually 4, ovate-oblong, acuminate. Corolla ½–⅝ in. long; tube fleshy, inflated, glabrous, rugose when dried; lobes 6–12, about as long as or a little shorter than the tube, lanceolate, subobtuse, glabrous. Stamens 16–20, in 2 rows one above the other, subsessile; anthers hairy, cordate at the base, the connective produced to a point. Ovary densely hairy; style 1–1⅛ in. long. Berry oblong, the size of a plum, hirsute when young, ultimately nearly glabrous, yellowish when ripe. Seeds 1–2, compressed, straight on one side, curved on the other. Fl. B. I. v. 3, p. 544; Dalz. & Gibs. p. 139; Bedd. Flor. Sylvat. t. 42; Wight, Ill. t. 147; Trim. Fl. Ceyl. v. 3, p. 79; Talb. Trees, Bomb. ed. 2, p. 207; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 1, p. 415.—Flowers: Nov.–Jan. VERN. *Mhová*; *Ippi*.

Southern districts of the Presidency, where it takes the place of *Bassia latifolia* of the Northern districts. Dalzell & Gibson say that it does not come further north than the latitude of Dharwar. KANARA: *Stocks* !, *Law* !, common, *Dalzell & Gibson*; Kála naddi, common, *Ritchie*, 1830!, *Talbot*!; Supa, *Ritchie*, 1830!; Suligeri, *Woodrow*; Santgul, *Talbot*!—DISTRIB. India (southern portion of the Western Peninsula); Ceylon.

The economic uses of this tree in the south of India are the same as those of *Bassia latifolia* in the Central table-land. See Watt, Dict. Econ. Prod. l. c.

3. **Bassia malabarica,** *Bedd. For. Man. in Flor. Sylvat.* (1872) p. cxl. A middle-sized tree; bark dark-colored, scaly. Leaves 3–8 by 1–2¼ in., very coriaceous, oblong to lanceolate, subobtuse, glabrous, dark-green and shining, base tapering; main nerves 15–25 pairs, very slender with closely reticulate veins between; petioles ¼–½ in. long. Flowers crowded towards the ends of the branches in dense fascicles; pedicels ½–¾ in. long. Calyx ⅜ in. long, divided nearly to the base; segments 4, ovate, subacute, the 2 outer glabrous or nearly so, the 2 inner hairy. Corolla ½ in. long; tube densely rufous-hairy both inside and outside, slightly shorter than the lobes; lobes 6 (rarely 7), oblong, obtuse, fulvous-hairy outside. Stamens 16–18 in 2 rows; filaments densely rufous-hairy; anthers glabrous or with a very small tuft of hairs between the basal lobes, cordate at the base, the connective much produced. Ovary glabrous; style ¾ in. long. Berry oblong-lanceolate, glabrous when young. Fl. B. I. v. 3, p. 544; Talb. Trees, Bomb. ed. 2, p. 207; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Icon. Prod. v. 1, p. 416.—Flowers: Nov.–Jan.

In the southern districts of the Presidency. KANARA: southern parts of N. Kanara along the banks of rivers and in moist forests from near the sea-level to 2000 ft., *Talbot*; Sampkhand (N. Kanara), *Woodrow*.

5. **PALAQUIUM,** Blanco (1837).

DICHOPSIS, Thwaites (1864).

Trees with milky juice. Leaves coriaceous, often minutely tomentose beneath. Flowers fascicled, axillary or on the naked branches below a

terminal tuft of leaves, pedicellate. Calyx-segments 6 in 2 series, subequal, the 3 exterior subvalvate, enclosing the 3 imbricate interior ones. Corolla-lobes 6 in 2 series, usually acute, imbricate or contorted. Stamens 12–18 (usually 12), attached to the base of the corolla, 1-seriate or the alternate ones attached a little higher up; filaments rather long or the alternate shorter; anthers lanceolate, dehiscing subextrorsely, acute, obtuse, emarginate or bifid, the connective produced beyond the cells; staminodes 0. Ovary villous, 6-celled; style subulate. Berry fleshy, ellipsoid or ovoid. Seed solitary (or 2); testa crustaceous, shining; albumen 0; cotyledons thick, fleshy; radicle very short.—DISTRIB. S. India, Ceylon, and the Malayan Archipelago, 1 species in Samoa; species 30.

1. **Palaquium ellipticum,** *Engler, in Engl. & Prantl, Pflanzenf.* v. 4, part 1 (1897) p. 135. A large tree reaching 100 ft. high; trunk without branches for a considerable height. Leaves 3–4½ by 1½–2¼ in., elliptic or elliptic-obovate, shortly and obtusely acuminate, coriaceous, dark-green above, paler beneath, glabrous on both sides, base acute; main nerves 8–12 pairs; petioles ½–1 in. long, glabrous or faintly puberulous. Flowers axillary; pedicels solitary or 2 or 3 (rarely more) together, pubescent or nearly glabrous, ¾–1½ in. long. Calyx 6-partite, densely villous with fulvous appressed hairs; segments ⅓ in. long, 2-seriate, the 3 exterior broadly ovate, subacute, transversely rugose, the 3 inner lanceolate, acute, narrower and a little longer than the outer. Corolla ½ in. long, dark-red; tube shorter than the lobes, hairy inside; lobes ovate-oblong, subobtuse, silky on the back. Stamens 12–18; filaments very short, hairy; anthers narrowly lanceolate, acute, the connective much produced and bifid at the apex. Ovary villous; style exserted, glabrous. Berry 1½ in. long, oblong, subacute, glabrous. *Dichopsis elliptica,* Benth. & Hook. f. Gen. Pl. v. 2, p. 658; C. B. Clarke, in Hook. f. Fl. B. I. v. 3, p. 542; Talb. Trees, Bomb. ed. 2, p. 207; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 3, p. 102. *Bassia elliptica,* Dalz. in Kew Journ. Bot. v. 3 (1851) p. 36; Dalz. & Gibs. p. 139; Bedd. Flor. Sylvat. t. 43. —Flowers: Feb. VERN. *Pánchoti-pálla.*

Western Ghâts from Bombay southwards ascending to 4000 ft. KANARA: *Stocks!, Dalzell!*—DISTRIB. Southern parts of the W. Peninsula of India.

The Indian Gutta-percha Tree. Yields a gummy product known as *pálá* gum, which has been exported to Singapore for the purpose of adulterating gutta-percha, the best quality of which is the product of the *Palaquium* (*Dichopsis*) *Gutta.* See Watt, Dict. Econ. Prod. l. c.

6. **MIMUSOPS,** Linn.

Trees with milky juice. Leaves coriaceous, often with slender parallel nerves. Flowers fascicled or solitary, axillary. Calyx-segments 6–8, in 2 series, the exterior subvalvate, enclosing the interior imbricate ones. Corolla-tube short, broad; lobes 18 or 24, of which 12 or 16 are exterior and 1–2-seriate, 6 or 8 interior 1-seriate. Stamens 6 or 8, attached at the base of the corolla and opposite the lobes of its interior series; filaments short, dilated, free, or connate into a tube with the staminodes; anthers lanceolate, the connective usually produced beyond the cells; staminodes 6 or 8, subpetaloid, variously toothed or lacerate, alternate with the stamens in the same series, or connate at the base

with them. Ovary hirsute, 6–8-celled. Berry globose; epicarp crustaceous. Seeds few or solitary, obliquely ovate, slightly compressed; testa crustaceous or hard, shining; hilum small and basilar or elongate and lateral; albumen fleshy; cotyledons flat.—DISTRIB. Tropics of both hemispheres; species about 30.

Calyx-segments 8; stamens 8; staminodes lanceolate, acuminate, hairy	1. *M. Elengi.*
Calyx-segments 6; stamens 6; staminodes bifid or denticulate at the apex, glabrous	2. *M. hexandra.*

1. **Mimusops Elengi,** *Linn. Sp. Pl.* (1753) p. 349. A large glabrous evergreen tree 40–50 ft. high, with a compact leafy head and short erect trunk; bark smooth, scaly. Leaves $2\frac{1}{2}$–4 by $1\frac{1}{4}$–2 in., elliptic, shortly acuminate, glabrous, base acute or rounded; petioles $\frac{1}{2}$–1 in. long. Flowers white, fragrant, nearly 1 in. across, solitary or in fascicles of 2–6; buds ovoid, acute; pedicels $\frac{1}{4}$–$\frac{3}{4}$ in. long, appressedly pubescent, often deflexed. Calyx $\frac{3}{8}$ in. long, fulvous-pubescent; segments 8, the 4 outer ovate-lanceolate, acute, the 4 inner narrower than the outer. Corolla longer than the calyx; tube $\frac{1}{16}$ in. long; lobes $\frac{1}{8}$ in. long, about 24, in 2 series, the inner series of 8 the outer of 16 lobes, linear-oblong, acute. Stamens 8, opposite the inner circle of lobes; filaments short, glabrous; anthers glabrous, slightly twisted, acuminate; staminodes 8, alternate with the stamens, lanceolate, acuminate, densely clothed on the back and margins with white hairs. Ovary appressedly silky-pubescent; style grooved, slightly longer than the corolla. Berry about 1 in. long, ovoid, yellow when ripe. Seed solitary, ovoid, compressed, brown, shining. Fl. B. I. v. 3, p. 548; Grah. Cat. p. 106; Dalz. & Gibs. p. 140; Bedd. Flor. Sylvat. t. 40; Wight, Icon. t. 1586; Trim. Fl. Ceyl. v. 3, p. 86; Talb. Trees, Bomb. ed. 2, p. 208; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 5, p. 249. —Flowers: Jan.–Mar. VERN. *Borsali*; *Bakuli*; *Vávli.*

Often planted round Mahometan tombs as an ornamental tree. KONKAN: Ravines in the Ghâts, *Dalzell & Gibson*; evergreen forests of the Konkan, *Talbot*; Matheran, *H. M. Birdwood*; Mâhar, *Graham*; Bombay, *Cooke*! DECCAN: Khandala, *Graham.* KANARA: evergreen forests of N. Kanara, *Talbot*; Divimana Ghât, *Woodrow*; Kúla naddi, below Supa, *Ritchie*, 1103! GUJARAT: *Cooke*!—DISTRIB. India (W. Peninsula); Ceylon, Malaya; cultivated in the Tropics.

The fragrant flowers are used for making garlands, and a perfume is distilled from them. The bark is used in native medicine, the wood is valuable, and an oil is expressed from the seeds. See Watt, Dict. Econ. Prod. l. c.

2. **Mimusops hexandra,** *Roxb. Cor. Pl.* v. 1 (1795) p. 16, t. 15. A large evergreen glabrous tree 50–60 ft. high, with a shady head; trunk erect without branches for a considerable height; bark blackish-grey, deeply furrowed. Leaves coriaceous, 2–$4\frac{1}{2}$ by 1–2 in., obovate or oblong, rounded or emarginate at the apex, glabrous on both sides, dark green and polished above, paler beneath, base acute; main nerves 12–20 pairs, not conspicuous; petioles $\frac{3}{8}$–$\frac{1}{2}$ in. long, channelled above, glabrous. Flowers whitish, axillary, solitary or in fascicles of 2–6; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, glabrous or nearly so. Calyx rusty-tomentose outside; segments 6, reflexed, ovate, subacute, $\frac{1}{6}$ in. long, the 3 inner rather narrower than the 3 outer, ciliate. Corolla-tube $\frac{1}{20}$ in. long; lobes usually 18, about $\frac{1}{6}$ in. long, 2-seriate, the 6 inner oblanceolate, shortly clawed, a little longer or almost equal to the outer, the 12 outer linear, acute.

Stamens 6; filaments as long as the acute (not acuminate) anthers; staminodes 6, alternate with the stamens, bifid or denticulate at the apex, glabrous. Ovary silky-pubescent, 12-celled. Berry usually 1 (rarely 2)-seeded, of the size and shape of an olive, reddish-yellow when ripe. Seed ovoid, reddish-brown, shining. Fl. B. I. v. 3, p. 549; Grah. Cat. p. 106; Dalz. & Gibs. p. 140; Bedd. For. Man. in Flor. Sylvat. p. cxli; Trim. Fl. Ceyl. v. 3, p. 86; Talb. Trees, Bomb. ed. 2, p. 208; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 5, p. 251. *Mimusops indica*, A. DC. Prodr. v. 8 (1844) p. 205; Wight, Icon. t. 1587.—Flowers: Sept.–Nov. VERN. *Kirni*; *Râyan*.

Common in the dry forests of the Deccan, Khandesh and Gujarat. KONKAN: *Law!*; Malabar hill (Bombay), *Graham, Woodrow*. DECCAN: Pál jungles (Khandesh), *Kanitkar!*; east of Junnar (Poona districts), *Kanitkar!*; Imampur, near Ahmednagar, *Graham*. S. M. COUNTRY: Belgaum, *Ritchie*, 1829! GUJARAT: *Talbot, Dalzell & Gibson*.—DISTRIB. India (W. Peninsula, Banda); Ceylon; cultivated in N.W. India.

The wood is tough and used for making sugar-mills, oil-presses, &c., and is an excellent wood for turning. The bark is used in medicine, and the fruit is eaten by the poorer classes in times of scarcity. See Watt, Dict. Econ. Prod. l. c.

Mimusops Kauki, Linn. Sp. Pl. (1753) p. 349. A tree with ovate or obovate glabrous leaves and a handsome straight stem, a native of Malaya and Tropical Australia, is occasionally grown. The fruit, which is globose, slightly acid, and about ¾–1 in. in diameter, is known in Goa as *pome* or *fructa d'Adao* (Adam's apple) and is eaten. Fl. B. I. v. 3, p. 549; Grah. Cat. p. 106; Dalz. & Gibs. Suppl. p. 50; Watt, Dict. Econ. Prod. v. 5, p. 252.

Achras Sapota, Linn. Sp. Pl. ed. 2 (1762) p. 470. The *Sapodilla Plum* of the W. Indies, introduced from America and now cultivated more or less throughout India for its fruit. It has white scentless flowers, and the fruit, which is about as large as and of the shape of a hen's egg, ripens from November to March and usually fetches a good price in the market, though not much eaten by Europeans. The tree thrives best near the sea, but grows fairly well in the black soil of the Deccan. Fl. B. I. v. 3, p. 534; Grah. Cat. p. 106; Dalz. & Gibs. Suppl. p. 50; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Gard. in Ind. ed. 5, p. 372; Watt, Dict. Econ. Prod. v. 1, p. 80. VERN. *Chikali*.

ORDER LXXVIII. EBENACEÆ.

Trees or shrubs; wood often hard and heavy, sometimes black in the centre; juice not milky. Leaves alternate (rarely opposite), entire, usually coriaceous; stipules 0. Flowers usually dicœcious, axillary, cymose or solitary, usually bracteate; pedicels articulated under the flower. Calyx inferior, gamosepalous, often accrescent in fruit; lobes 3–7. Corolla gamopetalous; lobes 3–7, usually contorted, twisting to the right. MALE FLOWERS: Stamens as many or 2–3 times as many as the corolla-lobes or ∞, usually hypogynous; filaments free or paired or variously connate; anthers narrow, erect, basifixed, dehiscing longitudinally (rarely by an apical pore), often apiculate by the produced

connective, often hairy. Ovary rudimentary or 0. FEMALE FLOWERS: Staminodes usually fewer than the stamens of the male flowers or 0. Ovary superior, sessile; styles 2–8, free or more or less connate into a 2–8-fid style; cells as many or twice as many as the styles, imperfectly septate; ovules twice as many as the styles, attached to the inner angle of the cells, pendulous, anatropous. Fruit coriaceous or fleshy, indehiscent, 1- or few-seeded. Seeds pendulous, usually oblong, more or less compressed, longitudinally 2–3-furrowed; testa thin or coriaceous, smooth; albumen copious, uniform or ruminate; embryo axile; radicle superior.—DISTRIB. Warmer regions of both hemispheres, a few extra-tropical; genera 5 or 6; species about 250.

Flowers often 3-merous; ovary 3- or 6-celled	1. MABA.
Flowers mostly 4–5-merous; ovary 4–5- or 8–10-celled	2. DIOSPYROS.

1. **MABA,** Forst.

Trees or shrubs, usually with hard wood. Leaves alternate. Flowers dicœcious, axillary, solitary or shortly cymose, usually 3 (rarely 4–6)-merous. Calyx campanulate, sometimes accrescent, 3-fid (rarely truncate or 4–6-fid). Corolla campanulate or tubular; lobes 3 (rarely 4–6), twisted to the right. MALE FLOWERS: Stamens 3–∞ (usually 9), mostly glabrous; filaments distinct or variously connate; anthers oblong or linear-lanceolate, dehiscing by lateral slits. Rudimentary ovary small. FEMALE FLOWERS: Staminodes 0 or fewer than the stamens of the male flowers. Ovary 3-celled, the cells 2-ovulate, or 6-celled, the cells 1-ovulate; styles or style-branches 3. Fruit globose or ovoid, baccate or dry. Seeds 1–6; albumen not ruminate in the Indian species.—DISTRIB. Warmer regions of both hemispheres; species 59.

Calyx 3-4-lobed; ovary hairy	1. *M. nigrescens.*
Calyx truncate; ovary glabrous	2. *M. micrantha.*

1. **Maba nigrescens,** *Dalz. in Dalz. & Gibs. Bo. Fl.* (1861) p. 142. A large shrub or small tree (15–35 ft., *Ritchie,* MS. in Herb. Kew.); young shoots clothed with ferruginous pubescence. Leaves 1¼–3 by ½–1 in., coriaceous, oblong-lanceolate, subacute, glabrous above, fulvous-hairy on the midrib beneath, reticulately veined, margins undulate, more or less ciliate; petioles ⅛ in. long, densely fulvous-hairy. MALE FLOWERS 3–4-merous, subsessile, in short cymes of 1–5 flowers. Calyx ⅛–¼ in. long, densely fulvous-hairy; lobes 3–4, triangular, acute, ⅒ in. long. Corolla ⅛ in. long, white; tube about equalling the lobes; lobes 3–4, obovate, obtuse, densely hairy on the back. Stamens in 3-merous flowers 9, in 4-merous flowers 4–6, glabrous, hypogynous; filaments slender; anthers ⅒ in. long, linear, acute. Rudimentary ovary hairy. FEMALE FLOWERS 1–2 together, 3-merous. Calyx ⅛ in. long, fulvous-hairy; lobes broadly ovate or suborbicular. Corolla ¼ in. long; lobes oblong, rounded at the apex. Staminodes 0. Ovary hairy, 3-celled. Fruit ellipsoid, clothed when young with fulvous silky hairs; fruiting calyx cup-shaped, ½ in. wide. Fl. B. I. v. 3, p. 551; Hiern, Monogr. Eben. (1873) p. 115; Talb. Trees, Bomb. ed. 2, p. 209; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 5, p. 102.—Flowers: Nov.–Feb. VERN. *Rakta-rora.*

Confined in the Bombay Presidency to the Konkan and Kanara. KONKAN: *Law!*;

evergreen forests, *Talbot*; near Goa, *Dalzell*!; Amboli Ghát, *Woodrow* KANARA: evergreen forests on the Ghâts of N. Kanara near Nilkund and the falls of Gairsoppa, *Talbot*; Kála naddi, *Ritchie*, 85!; river banks at Mulas, *Ritchie*, $\frac{85}{2}$!—DISTRIB. India (Mysore).

2. **Maba micrantha,** *Hiern, in Trans. Camb. Phil. Soc.* v. 12 (1873) p. 133. A middle-sized tree. Leaves 3½–5 by 1¼–2 in., coriaceous, elliptic-oblong, obtusely acuminate, glabrous, acute or somewhat rounded at the base; petioles ¼ in. long, rugose, glabrous. MALE FLOWERS not known. FEMALE FLOWERS axillary, solitary, sessile, ¼ in. long. Calyx tubular, entire, truncate, with a few imbricate bifarious scales at the base. Corolla tubular, divided to about the middle, thrice as long as the calyx; lobes 3, ovate, obtuse, spreading. Staminodes 6, inserted at the base of the corolla-tube, distinct; filaments twice as long as the barren anthers. Ovary hemispheric, glabrous, 6-celled; ovules solitary in each cell, pendulous; styles 3, erect, rather thick, obtuse at the apex. Fl. B. I. v. 3, p. 552; Talb. Trees, Bomb. ed. 2, p. 209; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163. *Holochilus micranthus*, Dalz. in Kew Journ. Bot. v. 4 (1852) p. 291; Dalz. & Gibs. p. 142.—Flowers: Feb.–Mar.

Southern Ghâts, *Dalzell*!

There is but 1 specimen (in fruit) in Herb. Kew. The description has been taken from that of Dalzell in Kew Journ. Bot. l. c. Dalzell never found the male flowers, and neither Mr. Talbot nor Mr. Woodrow has found Dalzell's plant.

2. DIOSPYROS, Linn.

Trees or shrubs. Leaves alternate (rarely subopposite). Flowers dicœcious (rarely polygamous), in cymes which are axillary or along the old branches, sometimes (the females often) reduced to a single flower. Calyx gamosepalous, 3–7 (usually 4–5) -fid or -partite, pubescent and often accrescent beneath the fruit, rarely truncate. Corolla urceolate, tubular, campanulate or hypocrateriform, more or less pubescent outside; lobes 3–7 (usually 4–5), twisted to the right. MALE FLOWERS: Stamens 4–∞ (usually 16), attached to the base of the corolla or hypogynous; filaments in pairs, or variously connate, or free; anthers linear or lanceolate. Ovary rudimentary or 0. FEMALE FLOWERS: Staminodes 0–16. Ovary conical or globose, 4–10-celled; ovules solitary (rarely 2) in each cell; styles or style-branches 1–4. Fruit globose, ellipsoid or ovoid-conic, usually supported by the enlarged calyx; the flesh often pulpose or viscid.—DISTRIB. Chiefly tropical; species 153.

Albumen of seeds ruminate; leaves sometimes subopposite.
  Leaves often subopposite.
    Male corolla more or less tubular ..... 1. *D. Melanoxylon.*
  Leaves all alternate.
    Fruiting calyx not much plicate.
      Male corolla shortly urceolate ..... 2. *D. sylvatica.*
      Male corolla tubular ..... 3. *D. Candolleana.*
    Fruiting calyx much plicate ..... 4. *D. crumenata.*
Albumen of seeds not ruminate; leaves always alternate.
  Male calyx almost truncate ..... 5. *D. oocarpa.*
  Male calyx distinctly lobed.
    Fruit clothed with stinging hairs ..... 6. *D. pruriens.*
    Fruit not clothed with stinging hairs.
      Male flowers panicled.

Corolla urceolate, clothed outside with black velvety hairs ..... 7. *D. paniculata.*
Male flowers in short cymes.
Corolla tubular.
Fruiting calyx with internal elevated rim at top of its tube ..... 8. *D. Ebenum.*
Corolla urceolate or campanulate; stamens 8–22.
Anthers dehiscing by apical pores ..... 9. *D. microphylla.*
Anthers dehiscing by longitudinal slits.
Small or middle-sized trees, often spinescent.
Male calyx glabrous outside; staminodes 4 ... 10. *D. montana.*
Male calyx hairy outside.
Male calyx pubescent inside; staminodes 12 ..... 11. *D. cordifolia.*
Male calyx glabrous inside; staminodes 7-9..... 12. *D. Chloroxylon.*
Corolla ovoid or oblong, shortly lobed; stamens 40 or more. Tree, not spinescent ..... 13. *D. embryopteris.*

1. **Diospyros Melanoxylon,** *Roxb. Cor. Pl.* v. 1 (1795) p. 36, t. 46. A middle-sized deciduous tree reaching 50 ft. in height; bark dark-grey or black, exfoliating in rectangular scales; young parts and inflorescence clothed with grey or tawny tomentum. Leaves 2½–6 by 1–2¾ in., alternate or subopposite, coriaceous, elliptic or elliptic-oblong, obtuse or subacute, softly tawny-tomentose on both sides when young, glabrous above and pubescent beneath when mature, base usually acute, rarely rounded; main nerves 6–10 pairs with reticulate veins between; petioles ¼–⅓ in. long. MALE FLOWERS 4–6-merous, 3–12 together, in tawny-tomentose panicled drooping cymes longer than the petioles. Calyx campanulate, ⅛–¼ in. long, hairy on both sides; lobes 4–6, shorter than the tube, subacute. Corolla more or less tubular, about twice as long as the calyx, pubescent outside, glabrous inside; lobes 4–6, broadly ovate, acute, about ⅛ in. long. Stamens 12–16 (in pairs when 16); anthers linear-oblong, acuminate. FEMALE FLOWERS rather longer than the male, solitary, subsessile, 4–5-merous. Calyx hairy on both sides, 4–5-gonal. Corolla as in the male. Staminodes 8–10. Ovary densely hairy, 4–8-celled; ovule solitary in each cell; styles 2, bifid. Fruit yellow when ripe, ovoid or globose, 1–1¼ in. long; fruiting calyx thickly coriaceous, nearly flat, the lobes undulate, often with reflexed margins. Seeds 2–8, compressed, oblong; testa rugose, shining; albumen ruminate. Fl. B. I. v. 3, p. 564; Hiern, Monogr. Eben. (1873) p. 159; Trim. Fl. Ceyl. v. 3, p. 99; Talb. Trees, Bomb. ed. 2, p. 212; Watt, Dict. Econ. Prod. v. 3, p. 147. *Diospyros Tupru*, Buch.-Ham. in Trans. Linn. Soc. v. 15 (1827) p. 111; Hiern, Monogr. Eben. (1873) p. 158; C. B. Clarke, in Hook. f. Fl. B. I. v. 3, p. 563; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164. *D. Wightiana*, Wall. Cat. 4406; Bedd. Flor. Sylvat. t. 67. *D. exsculpta*, Buch.-Ham. in Trans. Linn. Soc. v. 15 (1827) p. 110; Dalz. & Gibs. p. 142.—Flowers: Feb.–Apr. VERN. *Támrag*; *Támraj*; *Temru.*

Common in dry deciduous forests of the Presidency, *Talbot.* KONKAN: *Stocks!* S. M. COUNTRY: hills N. of Belgaum, *Ritchie*, 1108!, *Gibson!*

The tree furnishes a good ebony. Mr. Talbot says that he has seen 8 inches of ebony obtained from a 16-inch tree. The fruit, though very astringent, is eaten and much appreciated during the hot season.—DISTRIB. India (W. Peninsula); Ceylon, not common.

Note.—I have united *D. Tupru*, Buch.-Ham., with this as has been done by Sir D.

Brandis [For. Fl. (1874) p. 295]. The only distinguishing character given in Hook. f. Fl. B. I. (*l. c.*) is that the leaves of *D. Melanoxylon* are narrowed at both ends, while those of *D. Tupru* are obtuse. The leaves vary considerably, and the difference between young and mature leaves is often remarkable. There are at present in Herb. Kew. two specimens collected by Dr. Ritchie at two different seasons of the year, both from the same locality (the hills north of Belgaum) and possibly from the same tree, as both specimens bear the same number (1108 and $\frac{1108}{2}$). Of these specimens, one has been named by Mr. Clarke *D. Tupru*, and the other *D. Melanoxylon*. Mr. Talbot, who has an intimate knowledge of the tree, admitted the species *D. Tupru* in the first edition of his 'Trees and Woody Climbers,' remarking, however, that he did not know the tree as distinct from *D. Melanoxylon*, but in his second edition he unites the two species.

2. **Diospyros sylvatica,** *Roxb. Cor. Pl.* v. 1 (1795) p. 37, t. 47. A medium-sized tree reaching 60 ft. (*Talbot*); bark dark-colored, thin, smooth, the inner bark yellow. Leaves alternate, 3–5 by 1–2½ in., elliptic, acute or acuminate, membranous, glabrous and shining above, paler beneath, base usually acute; petioles ¼–⅜ in. long. MALE FLOWERS 3–5 (usually 4) -merous, in axillary, 6–10-flowered cymes which are ¼–½ in. long; peduncles bracteate at the base, ⅛ in. long. Calyx very small, about $\frac{1}{20}$ in. long, pubescent; lobes short, rounded. Corolla urceolate, $\frac{1}{10}$ in. long; lobes equalling the tube. Stamens 13–22, usually in pairs. FEMALE FLOWERS larger than the male, 3–4 (usually 4) -merous, solitary; pedicels ¼–⅓ in. long. Calyx much longer than in the male, ⅜ in. long; lobes ovate-oblong, acute, ⅕ in. long. Corolla ⅓ in. long. Staminodes 4, inserted on the corolla and alternate with its lobes. Ovary 6–8-celled; ovule 1 in each cell; styles 3 or 4. Fruit ½–¾ in. in diam., globose, smooth, dark-green; fruiting calyx much enlarged, flat, spreading, foliaceous. Seeds 2–8, oblong, nearly ½ in. long, rugose, shining, brown; albumen ruminate. Fl. B. I. v. 3, p. 559; Bedd. Icon. Pl. Ind. Or. t. 121; Hiern, Monogr. Eben. (1873) p. 161; Trim. Fl. Ceyl. v. 3, p. 98; Talb. Trees, Bomb. ed. 2, p. 211; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 3, p. 155.—Flowers: Jan.–Feb.

KONKAN: *Law*!; Matheran, *Dalzell*!, *Woodrow*; evergreen forests in the Konkan, *Talbot*. KANARA: evergreen forests of the Yellapur and Siddapur subdivisions of N. Kanara, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

3. **Diospyros Candolleana,** *Wight, Icon.* tt. 1221 & 1222. A small tree 36 ft. high (*Ritchie*); young shoots pubescent, the hairs usually medifixed. Leaves 4–6 by 1¾–2¼ in., coriaceous, elliptic-oblong, shortly and obtusely acuminate, glabrous on both sides when mature, base narrowed or rounded, often shortly cuneate; midrib strong beneath, depressed on the upper surface; lateral nerves and veins inconspicuous: petioles ⅜–½ in. long, rugose, glabrous. MALE FLOWERS sessile, in dense axillary, fulvous-pubescent clusters. Calyx ⅙–⅕ in. long, fulvous-silky-hairy on both sides; lobes 4–5, ovate-oblong, acute or subobtuse, $\frac{1}{10}$–⅛ in. long. Corolla more than twice as long as the calyx, tubular, fulvous-hairy outside, glabrous inside; lobes 5, shorter than the tube. Stamens 10, in pairs; anthers lanceolate, very acute, glabrous. FEMALE FLOWERS larger and thicker than the male, in short axillary 2–10-flowered cymes. Calyx ⅜ in. long, hairy; lobes ¼ in. long, subacute, with reflexed margins. Staminodes 4–5 (10 in the form *canarica*, Bedd.), glabrous. Ovary 4-celled; styles 2–5, short. Fruit globose or ellipsoid, pinkish (*Ritchie*),

glabrous; fruiting calyx flat or shallowly cupuliform, the lobes triangular with reflexed margins. Seeds 3–4, usually compressed; testa thin, brown; albumen ruminate. Fl. B. I. v. 3, p. 566; Dalz. & Gibs. p. 142; Bedd. For. Man. in Flor. Sylvat. p. cxliv; Talb. Trees, Bomb. ed. 2, p. 213; Watt, Dict. Econ. Prod. v. 3, p. 137 (*not* of Thwaites). *Diospyros canarica*, Bedd. Icon. Pl. Ind. Or. t. 134. *D. hirsuta*, Hiern, Monogr. Eben. (1873) p. 163 (*partly*).—Flowers: Feb.–June. VERN. *Karigida.*

Throughout the Konkans and Kanara in evergreen forests. KONKAN: *Stocks!*; near Vingorla, *Dalzell!*; near Goa, *Dalzell!* DECCAN: Phunda Ghát, *Ritchie*, $\frac{26}{2}$! S. M. COUNTRY: Rámghát, *Ritchie*, 96! KANARA: common near the coast at Karwar, *Talbot.*—DISTRIB. India (W. Peninsula).

4. **Diospyros crumenata,** *Thwaites, Enum. Ceyl. Pl.* (1860) p. 179. A very large tree with cylindric trunk, reaching 100–150 ft. high (*Talbot*); bark thin, scaly, cinereous; young branches glabrous. Leaves coriaceous, 2–5 by 1–2 in., elliptic-oblong, shortly and abruptly acuminate, finely reticulately veined, glabrous, base rounded or slightly narrowed; midrib depressed on the upper side; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long, channelled above. MALE FLOWERS in short 3–5-flowered hairy cymes. Calyx tubular, $\frac{1}{5}$–$\frac{1}{4}$ in. long, hairy outside, glabrous and shining inside; teeth very short (scarcely $\frac{1}{20}$ in. long), triangular, acute. Corolla cream-white, tubular, coriaceous, about $\frac{1}{2}$ in. long, clothed outside with appressed hairs; lobes 4, about $\frac{1}{2}$ the length of the tube, recurved. Stamens about 12, subequal, glabrous, hypogynous; filaments very short; anthers linear-lanceolate, very acute. FEMALE FLOWERS solitary, larger than the male; pedicels stout, hairy, $\frac{1}{4}$ in. long. Calyx $\frac{1}{3}$ in. long, hairy on both sides, plicate; lobes 4, broad, rounded and apiculate, with large and deep pouches between them. Corolla cream-white, tubular, fulvous-hairy outside, slightly longer than the calyx; lobes 4, tomentose on both sides and with undulate margins. Staminodes 8, inserted at the base of the corolla-tube. Ovary hairy, 8-celled; stigmas 4. Fruit subglobose, $1\frac{1}{2}$–2 in. in diam., at length glabrous; fruiting calyx thickened, spreading, $1\frac{1}{4}$ in. in diam. Seeds black, shining, 1 by $\frac{1}{2}$ in.; albumen ruminate. Fl. B. I. v. 3, p. 567; Bedd. For. Man. in Flor. Sylvat. p. cxlv; Hiern, Monogr. Eben. (1873) p. 169; Bedd. Icon. Pl. Ind. Or. t. 126; Trim. Fl. Ceyl. v. 3, p. 102; Talb. Trees, Bomb. ed. 2, p. 212; Watt, Dict. Econ. Prod. v. 3, p. 138.—Flowers: Mar.–May.

Apparently confined to Kanara, where it is common in the evergreen forests between the Gairsoppa and Dodmune Ghâts, *Talbot*; Dodmune (N. Kanara), *Talbot*, 3560!—DISTRIB. Ceylon.

5. **Diospyros oocarpa,** *Thwaites, Enum. Ceyl. Pl.* (1860) p. 180. A small or moderate-sized tree with thin smooth bark; young shoots pubescent. Leaves alternate, subcoriaceous, 3–$4\frac{1}{2}$ by $1\frac{1}{2}$–$2\frac{1}{4}$ in., ovate-elliptic, obtusely acuminate, glabrous and shining, base usually rounded; nerves and veins inconspicuous; petioles $\frac{1}{4}$–$\frac{3}{8}$ in. long, somewhat flattened, rugulose. MALE FLOWERS 3–7 together, subsessile, in axillary fulvous-silky cymes; bracts rounded, concave, silky-hairy. Calyx $\frac{1}{8}$–$\frac{1}{6}$ in. long, cylindric, silky, subtruncate at the apex, rounded or subtruncate at the base. Corolla thick, $\frac{1}{4}$–$\frac{1}{3}$ in. long, pubescent outside; lobes 3–4, about equalling the tube, ovate-oblong, subacute, much imbricated in bud. Stamens 9–12, unequal. FEMALE FLOWERS 1–3

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together, similar to and slightly larger than the male. Ovary 6–8-celled. Fruit ¾–1 in. long, cylindric when young, ellipsoid when ripe, rounded at the top, apiculate, 6-celled, seated on the slightly enlarged funnel-shaped persistent calyx. Seed oblong; albumen not ruminate. Fl. B. I. v. 3, p. 560; Hiern, Monogr. Eben. (1873) p. 171; Trim. Fl. Ceyl. v. 3, p. 97; Talb. Trees, Bomb. ed. 2, p. 210; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 3, p. 153.—Flowers: Jan.–Mar.

KONKAN: *Talbot, Dalzell*!; Wari, *Dalzell*!; S. Konkan, *Law*! KANARA: evergreen forests of N. Kanara, common on the Ghâts from Karwar to Ainshi, *Talbot*; Ainshi Ghât, *Talbot*!; Divimana (N. Kanara), *Woodrow*!—DISTRIB. India (W. Peninsula); Ceylon.

6. **Diospyros pruriens,** *Dalz. in Kew Journ. Bot.* v. 4 (1852) p. 110. A small tree; young parts softly hirsute; bark dark-colored, scaly. Leaves thinly subcoriaceous, 2–4 by ¾–1¾ in., elliptic-oblong, subacute or usually shortly and obtusely acuminate, fulvous-hairy on both sides, often glabrescent above except the depressed midrib, base usually rounded, sometimes subcordate; petioles $\frac{1}{10}$–¼ in. long, densely hirsute. MALE FLOWERS: Peduncles ½–⅓ in. long, close together in the upper axils, usually 1–2-flowered; pedicels 0–¼ in. long, articulated at the base; bracts small, ovate, caducous, glabrous inside. Calyx ¼ in. long, divided nearly to the base, fulvous-hairy on both sides; segments 4, linear-oblong. Corolla ½–¾ in. long, silky-hairy outside, glabrous inside; lobes 4, ovate-oblong, obtuse, about as long as the tube. Stamens 13–14, glabrous, unequal, hypogynous, connate at the base, shorter than the corolla-tube; filaments as long as the anthers. Rudimentary ovary densely hairy. FEMALE FLOWERS solitary, crowded in the upper axils; peduncles $\frac{1}{10}$–⅛ in. long. Calyx ¼ in. long, 4–5-partite; segments oblong, spreading, hairy on both sides. Corolla ⅜–½ in. long, 4-fid, constricted about the middle. Staminodes 4, small. Ovary fulvous-hairy, 4-celled; ovule 1 in each cell; styles 2, short, almost concealed by the hairs on the ovary, bifid at the apex. Fruit ovoid-conical, ⅔–1 in. long, 4-celled, 4-seeded, densely clothed with fulvous stinging hairs, supported by the persistent deflexed non-accrescent calyx-lobes. Fl. B. I. v. 3, p. 553; Dalz. & Gibs. p. 141; Bedd. Icon. Pl. Ind. Or. t. 129; For. Man. in Flor. Sylvat. p. cxliv; Hiern, Monogr. Eben. (1873) p. 185; Trim. Fl. Ceyl. v. 3, p. 95; Talb. Trees, Bomb. ed. 2, p. 210; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 3, p. 153.—Flowers: Nov.–Feb.

Southern parts of the Presidency. S. M. COUNTRY: Chorla Ghât, *Dalzell*!, *Ritchie*, 1833!, *Woodrow*. KANARA: evergreen forests of the southern Ghâts of N. Kanara, common, *Talbot*.—DISTRIB. India (southern Ghâts of the Western Peninsula).

7. **Diospyros paniculata,** *Dalz. in Kew Journ. Bot.* v. 4 (1852) p. 109. A middle-sized tree with cylindric tall stem; bark smooth, dark-colored; branches glabrous, somewhat angular. Leaves alternate, 3½–9 by 1⅜–3 in. (Dalzell l. c. says the leaves of the female tree are twice as large as those of the male), subcoriaceous, oblong, obtusely acuminate, glabrous, finely reticulately and conspicuously veined, base rounded or very shortly narrowed; petioles ½ in. long, wrinkled and usually transversely striate, glabrous. MALE FLOWERS ½–¾ in. long,

numerous, in panicled cymes 1–1½ in. long in the axils of fallen leaves; panicles, pedicels and buds pubescent with sooty-velvety hairs. Calyx ⅜ in. long, divided to the base, shortly nigro-pubescent on both sides; segments foliaceous, reticulately veined, broadly elliptic, obtuse, with a thick hard internal keel and widely reflexed margins. Corolla ⅝ in. long, clothed outside with sooty-velvety hairs, glabrous inside; tube pentagonal; lobes ⅜ in. long, elliptic-oblong, obtuse. Stamens 20, inserted in pairs at the base of the corolla-tube, glabrous; filaments short; anthers linear, acute. Rudimentary ovary 0. FEMALE FLOWERS solitary, axillary; pedicels ½–⅔ in. long, bracteate about the middle with large ovate caducous bracts. Calyx glabrescent. Ovary 4-celled; ovule 1 in each cell. Fruit ovoid, ¾–1¼ in. long, rounded at the apex, tipped with the remains of the style, clothed with ferruginous glandular hairs; fruiting calyx 5-lobed, enlarged, more or less plicate; lobes ½–⅔ in. long, much widened, auricled and imbricate at the base. Cotyledons foliaceous. Fl. B. I. v. 3, p. 570; Dalz. & Gibs. p. 141; Bedd. Icon. Pl. Ind. Or. t. 125; Hiern, Monogr. Eben. (1873) p. 190; Talb. Trees, Bomb. ed. 2, p. 213; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 3, p. 153.—Flowers: Nov.–Dec. VERN. *Kuri-kumar.*

S. M. COUNTRY: Chorla Ghát, *Dalzell!*, *Woodrow.* KANARA: Talaveri (N. Kanara Ghâts), *Ritchie*, 1884!; Divimana, *Woodrow*; frequent in the forests near the Nilkund and Gairsoppa Ghâts, *Talbot.*—DISTRIB. India (W. Peninsula).

8. **Diospyros Ebenum,** *Kœnig, in Phys. Sålsk. Hendl.* v. 1 (1776) p. 176. A large or moderate-sized tree with an erect trunk and leafy head; bark thin, grey; branchlets glabrous. Leaves subcoriaceous, 2–6 by ¾–2½ in., glabrous, elliptic-oblong or oblong-lanceolate, obtuse or shortly and bluntly acuminate, bright-green and shining above, somewhat paler beneath, reticulately veined; petioles ⅙–⅓ in. long. MALE FLOWERS 3–12 (very often 3) together, subsessile, in shortly peduncled cymes; peduncles ¼ in. long; buds linear, tapering; bracts small, caducous. Calyx ⅒–⅙ in. long, infundibuliform, glabrous or slightly hairy; lobes 4, very short, rounded, ciliate. Corolla pale greenish-yellow, tubular, ⅜ in. long before expansion; lobes 4, ovate, equalling or slightly shorter than the tube. Stamens 16 or more, very unequal, often connate in twos, threes, or sometimes fours; filaments more or less pubescent; anthers linear-lanceolate, acuminate. FEMALE FLOWERS solitary, larger than the male; pedicels short, 2-bracteate. Calyx much longer than in the male, deeply divided, with an elevated 4-lobed marginal ring at its mouth; lobes 4, ovate, acute. Staminodes 8, with double anthers. Ovary glabrous, 8-celled; style 1; stigmas 4. Fruit ¾ in. in diam., subglobose; fruiting calyx a hemispheric woody cup which receives the fruit, the 4 ovate acute thickened calyx-lobes spreading outwards. Seeds 3–8, dull-black, ⅜ in.; albumen not ruminate. Fl. B. I. v. 3, p. 558; Grah. Cat. p. 108; Wight, Icon. t. 188; Bedd. Flor. Sylvat. t. 65; Hiern, Monogr. Eben. (1873) p. 208; Trim. Fl. Ceyl. v. 3, p. 94; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 3, p. 138. *Diospyros assimilis*, Bedd. Madras For. Rep. (1866–67) p. 20, t. 1; C. B. Clarke, in Hook. f. Fl. B. I. v. 3, p. 558; Talb. Trees, Bomb. ed. 2, p. 210; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164. *D. nigricans*, Dalz. in Kew Journ.

Bot. v. 4 (1852) p. 110 (*not* of Wall. nor Bedd.); Dalz. & Gibs. p. 141.—Flowers: Feb.-Mar. VERN. *Abnus*; *Malyá*; *Kare*.

Confined to the southern districts of the Presidency. S. M. COUNTRY: Ghorla Ghát, *Dalzell & Gibson*. KANARA: evergreen forests, *Talbot*.

The wood furnishes the Ebony used for wood-carving in Kumpta and Honávar (N. Kanara). The quality is good, but large pieces are rare (*Talbot*).—DISTRIB. India (W. Peninsula, Assam); Ceylon, Malaya.

I have followed Hiern in uniting *D. assimilis*, Bedd., with this; indeed Beddome (Flor. Sylvat. t. 65) is doubtful as to their being separate species. I have not seen any authenticated specimens of Beddome's plant; there are none in Herb. Kew. Trimen (*l. c.*) points out that in the moist regions of Ceylon the leaves of *D. Ebenum* agree in form and venation with *D. assimilis*, Bedd., from S. Kanara.

9. **Diospyros microphylla,** *Bedd. For. Man. in Flor. Sylvat.* (1872) p. cxlv. A large tree 80–100 ft. high (*Talbot*), with a straight trunk, unbranched for a considerable height, buttressed at the base; bark dark, scaly; young branches verticillate, hirsute with long yellowish hairs; the older branches glabrous. Leaves ¾–2 by ½–⅞ in. (resembling those of the box tree), coriaceous, ovate-elliptic, acute or obtusely acuminate, glabrous above, sparingly hairy beneath when young, afterwards glabrous except the midrib, base tapering; petioles ⅛–⅙ in. long. MALE FLOWERS small, about ⅒–⅛ in. long, 4-merous, 1-4 together in subsessile minute axillary cymes. Calyx ⅛ in. long, densely fulvous-hairy outside; lobes 4, rounded. Corolla 4-cleft; lobes rounded, apiculate, with a line of hairs on the back. Stamens 16, united by their filaments in pairs, the inner the shorter; anthers ovate, dehiscing by apical pores. Rudimentary ovary minute, hairy. FEMALE FLOWERS solitary, subsessile. Calyx and corolla as in the male. Staminodes 0. Ovary 4-celled, pubescent; ovule 1 in each cell; style short, 2-partite. Fruit ⅓–¾ by ⅓–½ in., cylindric or oblong, pointed, glabrous. Seed 1 (rarely 2); albumen not ruminate. Fl. B. I. v. 3, p. 559; Bedd. Icon. Pl. Ind. Or. (1874) t. 133; Talb. Trees, Bomb. ed. 2, p. 212; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 3, p. 150. *Diospyros buxifolia*, Hiern, Monogr. Eben. (1873) p. 218.—Flowers: Mar. VERN. *Dula*; *Kare-kunchal*.

KONKAN: *Stocks!*, *Law!* KANARA: *Law!*, *Gibson!*; Yellapur, *Gibson!*; evergreen forests of N. Kanara, common on the Yellapur Ghâts, *Talbot*, 375.—DISTRIB. India (W. Peninsula); Malacca, Penang, Singapore, Java, Borneo.

10. **Diospyros montana,** *Roxb. Cor. Pl.* v. 1 (1795) p. 37, t. 48. A small or middle-sized tree, sometimes armed; young branches softly pubescent. Leaves 2½–4 by 1–2 in., ovate-oblong or elliptic, subacute or obtusely acuminate, more or less softly puberulous or tomentose when young, at length glabrous; base rounded, acute, or sometimes truncate; petioles ⅛–⅜ in. long. MALE FLOWERS in short, few-flowered panicles; pedicels bracteate at the base; bracts ovate, acute, strongly ciliate; buds ovoid, acute. Calyx ⅛ in. long, 4-lobed, glabrous outside and inside; lobes ⅒ in. long, broadly ovate, acute, ciliate, much enlarged in fruit. Corolla white, urceolate, about 3 or 4 times as long as the calyx; lobes a little shorter than the tube. Stamens 16, in 2 rows of 8, in opposite pairs united at the base, the outer the longest; anthers about ⅛ in. long (including the awn), lanceolate, usually with a long slender awn, glabrous. Rudimentary ovary fleshy, with 4 acute teeth at the apex. FEMALE FLOWERS axillary, solitary; pedicels nodding, stout, ⅛–⅕ in. long, with 2

small ovate bracts a little above the middle. Calyx ⅓ in. long, glabrous; lobes ¼ in. long, glabrous inside, ovate-oblong, obtuse. Corolla as in the male. Staminodes 4. Ovary globular, glabrous, 8-celled; ovule solitary in each cell; styles 4, bifid at the apex, glabrous. Fruit globose, 1–1½ in. in diam., supported by the persistent calyx whose lobes are slightly enlarged and reflexed, reddish-brown. Seeds 2–8. Fl. B. I. v. 3, p. 555 (in part); Grah. Cat. p. 107; Dalz. & Gibs. p. 142; Wight, Icon. t. 1225; Trim. Fl. Ceyl. v. 3, p. 92 (in part); Talb. Trees, Bomb. ed. 2, p. 211 (in part); Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 3, p. 150 (in part). VAR. *montana proper*, Hiern, Monogr. Eben. (1873) p. 222. *Diospyros Goindu*, Dalz. in Kew Journ. Bot. v. 4 (1852) p. 111; Dalz. & Gibs. p. 141.—Flowers: Jan.–Apr. VERN. *Goindu.*

KONKAN: *Stocks*!; hills eastward of Panwell, *Graham*, *Woodrow*; Karanja hill, *Dalzell*! S. M. COUNTRY: hills north of Belgaum, *Ritchie*, 972! KANARA: Mandele (N. Kanara), *Ritchie*, 972!; Kála naddi, *Ritchie*, 972!; N. Kanara Ghâts, *Talbot*.—DISTRIB. Throughout India; Ceylon, Malaya, Tropical Australia.

11. **Diospyros cordifolia,** *Roxb. Cor. Pl.* v. 1 (1795) p. 38, t. 50. A small tree with strong often branched thorns scattered over the trunk and larger branches. Leaves 1½–2¾ by ⅝–¾ in., oblong, obtuse, velvety on both sides, base rounded, cordate, or subtruncate; petioles ⅛–¼ in. long. MALE FLOWERS axillary; peduncles bearing usually 3 flowers at their apex; pedicels $\frac{1}{16}$ in. long. Calyx ⅛ in. long, hairy outside; lobes ⅛–⅙ in. long, elliptic, obtuse or subacute, pubescent inside and with ciliolate margins. Corolla white, ⅓ in. long, slightly pubescent outside; lobes ⅙ in. long, ovate-oblong, subacute. Stamens 16, in 2 rows of 8, in opposite pairs united at the base; anthers $\frac{1}{16}$ in. long, linear-oblong, obtuse or subobtuse, not awned, pubescent. FEMALE FLOWERS solitary; pedicels ¼ in. long; bracteoles $\frac{1}{16}$ in. long, oblong, obtuse, hairy and ciliate. Calyx ⅛–¼ in. long, glabrous or puberulous on both sides, deeply divided; lobes ⅙–¼ in. long, oblong, obtuse. Corolla white, ¼–⅓ in. long; lobes obtuse. Staminodes 12 in a single row, lanceolate; filaments long. Ovary globose, glabrous; styles 4, erect, bifid. Fruit ½–1 in. in diam., globose, yellow when ripe. Bedd. For. Man. in Flor. Sylvat. p. cxliii. *D. montana*, C. B. Clarke, in. Hook. f. Fl. B. I. v. 3, p. 555 (in part). *D. montana*, var. *cordifolia*, Hiern, Monogr. Eben. (1873) p. 222.—Flowers: Mar.–Apr.

KANARA: tolerably common in N. Kanara; Mandgod (N. Kanara), *Talbot*!; N. Kanara, *Kanitkar*!—DISTRIB. India (W. Peninsula); Ceylon.

Hiern (Monogr. Eben. p. 222) unites this with *D. montana*, Roxb., of which he makes it a variety. The points of difference between the two plants are however, I think, sufficient to maintain them as separate species. *D. cordifolia* differs from *D. montana* in the leaves, the number of staminodes, the male inflorescence (which is paniculate in *D. montana* and consists of 3 shortly-pedicelled flowers at the apex of the peduncle in *D. cordifolia*), the male calyx (which is hairy in *D. cordifolia* and glabrous in *D. montana*), and in the anthers of the fertile stamens, which in *D. montana* are lanceolate, glabrous, and usually awned, while in *D. cordifolia* they are linear, hairy, obtuse, not awned.

12. **Diospyros Chloroxylon,** *Roxb. Cor. Pl.* v. 1 (1795) p. 38, t. 49. A small tree, sometimes spinescent; bark deeply cracked; branchlets tomentose. Leaves alternate, thinly coriaceous, 1–2¼ by ½–1¼ in., elliptic, obovate or elliptic-oblong, obtuse or subacute, more

or less pubescent above, rusty-tomentose or fulvous-pubescent beneath; base acute or obtuse; nerves inconspicuous; petioles $\frac{1}{10}$–$\frac{1}{4}$ in. long, densely hairy. Inflorescence densely fulvous-pubescent; flowers white, 4-merous. MALE FLOWERS 4–10 together, subsessile on a short hairy peduncle $\frac{1}{12}$ in. long; bracts small, elliptic. Calyx subglobose, $\frac{1}{10}$ in. long, densely fulvous-hairy, deeply divided; segments 4, rounded, apiculate, ciliate, glabrous inside. Corolla 4-fid; lobes acute, with a line of hairs on the back of each lobe. Stamens 16, glabrous, in 2 rows, the inner smaller; anthers ovate, acute, as long as the longer filaments. FEMALE FLOWERS solitary, sessile, 4-merous. Calyx $\frac{1}{8}$ in. long, fulvous-hairy; lobes twice as long as the tube. Corolla as in the male but longer. Staminodes 7–9, glabrous, 1-seriate. Ovary glabrous, 8-celled; styles 4, erect, glabrous. Fruit globose, $\frac{1}{3}$ in. in diam., glabrous, edible; fruiting calyx nearly flat, $\frac{1}{3}$ in. in diam. Seeds 2–3; albumen not ruminate. Fl. B. I. v. 3, p. 560; Dalz. & Gibs. p. 140; Hiern, Monogr. Eben. (1873) p. 233; Talb. Trees, Bomb. ed. 2, p. 212; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 3, p. 137. *Diospyros capitulata*, Wight, Icon. tt. 1224, 1588 (*bis*).—Flowers: June. VERN. *Ninai*; *Nensi*.

DECCAN: Nasik, *Dalzell & Gibson*; Peint road 6 miles N. of Nasik, *Woodrow*. GUJARAT: common about Surat on the north side of the river, *Dalzell & Gibson*.—DISTRIB. India (Central and Southern India, Orissa, Carnatic).

13. **Diospyros embryopteris,** *Pers. Syn.* v. 2 (1807) p. 624. A small or middle-sized tree, glabrous except the very young parts and the inflorescence; branches numerous, spreading, forming a dense shady head; bark smooth, thick, blackish, flaking off in large pieces. Leaves variable in size, numerous, distichously spreading, coriaceous, 4–11 by 1–3½ in., oblong or oblong-lanceolate, obtuse or subacute, glabrous and shining, reticulately veined, the veins prominent in dried specimens, obscure in fresh ones, base usually tapering; petioles $\frac{3}{8}$–$\frac{3}{4}$ in. long, stout, wrinkled. MALE FLOWERS in shortly-peduncled, fulvous-pubescent, racemose, axillary, drooping cymes containing 2–7 flowers. Calyx $\frac{1}{4}$ in. long, hairy outside; lobes 4, broadly ovate, $\frac{1}{8}$ in. long, pubescent inside and with ciliate margins. Corolla $\frac{3}{8}$ in. long; lobes $\frac{1}{8}$–$\frac{1}{6}$ in. long, very thick, rounded at the apex and with a pubescent patch on the back of each lobe, imbricate. Stamens 24–64 (usually 40) in pairs, inserted at the base of the corolla-tube or on the receptacle beneath it; filaments hairy, about $\frac{1}{10}$ in. long; anthers $\frac{1}{4}$ in. long, nearly equal, linear, with a line of hairs up the middle. Rudimentary ovary a lobed fleshy disk. FEMALE FLOWERS larger than the male, 1 in. across, usually solitary, axillary, drooping; pedicels very short. Calyx deeply divided, glabrous or pubescent; segments 4, erect, broadly ovate, acute, dilated and subcordate at the base. Corolla $\frac{1}{2}$ in. long, campanulate, deeply divided; lobes 4, cordate, obtuse, recurved. Staminodes 1–12, hairy, usually inserted at the base of the corolla-tube (sometimes perhaps true stamens). Ovary glabrous or hairy, 8-celled; styles 4; stigmas lobed and undulate. Fruit large, 1½–3 in. in diam., usually solitary, subglobose, yellow, covered with a rusty easily detachable scurfiness, 8-celled, supported on the much enlarged persistent spreading or reflexed calyx; pericarp thin; pulp viscid and glutinous. Seeds 4–8, flattened, smooth, reddish-brown. Fl. B. I. v. 3, p. 556; Bedd. Flor.

Sylvat. t. 69; Hiern, Monogr. Eben. (1873) p. 257; Trim. Fl. Ceyl. v. 3, p. 93; Talb. Trees, Bomb. ed. 2, p. 211; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 3, p. 141. *Diospyros glutinosa*, Kœnig, ex Roxb. Hort. Beng. (1814) p. 40; Grah. Cat. p. 107.—Flowers: Mar.-May. VERN. *Temburi.*

Near creeks and backwaters along the coast of the Konkans and N. Kanara, also in evergreen forests of the Ghâts and in the beds of rivers and streams, *Talbot.* KONKAN: hilly parts of Salsette, *Graham, Woodrow*; without locality, *Ritchie*, 1831!—DISTRIB. Throughout India; Ceylon, Siam, Malayan Archipelago.

The unripe fruit is very astringent and an extract is employed in medicine.—It is also used as a tan for fishing-nets. The viscid pulp is used as glue for bookbinding and also as tar for caulking the seams of boats. See Watt, Dict. Econ. Prod. l. c.

Diospyros Kaki, Linn. f. Suppl. (1781) p. 439. A native of the Khasia hills, China and Japan, occasionally, though rarely, cultivated in Bombay for its edible fruit, which is yellow, about as large as an orange, and known as the *Chinese Fig* or *Chinese Plum.* Fl. B. I. v. 3, p. 555; Grah. Cat. p. 107; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 3, p. 145.—VERN. *Káki.*

ORDER LXXIX. STYRACACEÆ.

Trees or shrubs. Leaves alternate, simple; stipules 0. Flowers usually white (rarely red), regular, hermaphrodite (in the Indian species), usually in axillary or terminal simple or compound spikes or racemes; bracts usually small, sometimes obsolete. Calyx gamosepalous; tube more or less adnate to the ovary; limb 5 (rarely 4)-lobed or truncate, persistent. Corolla-tube reduced to a mere ring; petals 5 (rarely more), almost free, imbricate (in the Indian species). Stamens adnate in one or more series to the petals, double their number or indefinite; filaments free or connate; anthers round or linear. Ovary more or less inferior, 2–5-celled; ovules usually 2 on the inner angle of each cell, pendulous; style undivided, filiform or rather thick; stigma capitate, entire or lobed. Fruit drupaceous, usually 1 (rarely 2–3)-seeded. Seeds albuminous; embryo straight or curved.—DISTRIB. Warmer regions of Asia, Australia, and America; genera 7; species about 350.

1. SYMPLOCOS, Linn.

Trees or shrubs, usually glabrous. Leaves often turning yellow when dry, alternate, coriaceous or membranous, toothed or entire. Flowers usually white, in axillary spikes or racemes, sometimes reduced to few-flowered fascicles or to a single flower; bracts usually solitary at the base of each pedicel, caducous; bracteoles 1–3 beneath the flower. Calyx-tube adnate, short when in flower, often enlarged in fruit; lobes 5, imbricate. Petals 5 in 1 series, or 6–10 in 2 series, free almost or entirely to the base, or obscurely connate (rarely connate into a tube), imbricate. Stamens usually numerous, ∞-seriate, adnate to the corolla-tube or to the petals, the outer the longer; filaments filiform or flattened at the base; anthers short, dehiscing longitudinally. Ovary inferior (in the Indian species), 3 (rarely 2 or 4)-celled; ovules 2,

pendulous from the inner angle of each cell; style usually filiform; stigma capitate or small, scarcely lobed. Drupe ellipsoid or subglobose; stone usually woody, often ribbed, 1–3-seeded. Seeds oblong; embryo terete, straight or curved, in the centre of fleshy albumen; cotyledons much shorter than the radicle.—DISTRIB. Warmer regions of Asia, Australia, and America; species about 280.

Fruit ⅓–¼ in. in diam., globose; bracteoles 3, minute	1. *S. spicata.*
Fruit ½ in. long, ovoid-oblong; bracteoles 2, ovate, acuminate, ⅛ in. long, shorter than the ovate bract	2. *S. Beddomei.*
Fruit 1¼ in. long, ovoid; bract and bracteoles not known	3. *S. kanarana.*
Fruit unknown; bracteoles lanceolate, as long as the ovate bract.	4. *S. Stocksii.*

1. **Symplocos spicata,** *Roxb. Hort. Beng.* (1814) p. 40. A small or middle-sized tree or large shrub; young parts glabrous except the inflorescence. Leaves variable in form and texture, 3–6 by 1¼–2¾ in., coriaceous or chartaceous, elliptic or elliptic-lanceolate, acute or acuminate, glabrous and shining, crenate, serrate or subentire (sometimes leaves with all 3 kinds of margin on the same plant), base acute; main nerves 6–8 pairs, not conspicuous; petioles ¼–½ in. long. Flowers yellowish-white, fragrant, sessile, in long (often branched) axillary glabrous or pubescent spikes, which are solitary or 2–3 from the same axil and 2–6 times as long as the petiole; bracteoles 3, beneath and embracing each flower, $\frac{1}{20}$ in. long, ovate, pubescent. Calyx $\frac{1}{16}$ in. long, glabrous; lobes rounded, about equalling the tube. Corolla divided almost to the base; petals ⅛ in. long, oblong, rounded at the apex. Stamens about 40. Style slender, without a ring of hairs at the base. Fruit ⅓–¼ in. long, globose, surmounted by a very short cylindric tube which is scarcely $\frac{1}{16}$ in. high. Stone fluted. Wight, Ill. t. 150; Bedd. For. Man. in Flor. Sylvat. p. cxlix; Gürke, in Engl. & Prantl, Pflanzenf. v. 4, part 1, p. 169, fig. 88, H; Trim. Fl. Ceyl. v. 3, p. 104; Talb. Trees, Bomb. ed. 2, p. 214; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 6, part 3, p. 400. *Symplocos spicata*, var. *laurina*, C. B. Clarke, in Hook. f. Fl. B. I. v. 3, p. 573. *S. laurina* (sp.), Wall. Cat. 4416; Grah. Cat. p. 104. *Hopea spicata*, Dalz. & Gibs. p. 140.—Flowers: Sept.–Dec. VERN. *Mirjoli.*

KONKAN: *Dalzell*!, *Law*!, *Stocks*! S. M. COUNTRY: Castlerock, *Cooke*!; Rámghát, *Ritchie*, 953!, *Law* ex *Graham*. KANARA: *Law*!; evergreen forests of N. Kanara Ghâts, common, *Talbot*; Kála naddi, *Ritchie*, 953!; Jagalbet, *Ritchie*, 953!—DISTRIB. Throughout a great part of India in the hilly country; Ceylon, China, Japan, Australia.

The stones of the fruit are strung as beads to make necklaces; the leaves are used in the Darjeeling hills to give a yellow dye (*Gamble*).

2. **Symplocos Beddomei,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 3 (1882) p. 582. A moderate-sized very beautiful tree with a shady head; bark often marked with white patches. Leaves crowded at the ends of the branches, subcoriaceous, 4–6 by 1¾–2½ in., elliptic-oblong, acute or acuminate, glandular-serrate, crenate, or subentire, glabrous on both sides, polished and shining above, base narrowed; nerves 6–10 pairs; petioles ⅜ in. long. Flowers sessile or shortly pedicelled, white, fragrant (having the odor of hawthorn), in pubescent spikes or racemes 2–5½ in. long, each flower embraced in bud by a large broadly ovate acute foliaceous hairy and ciliate reticulately veined deciduous bract

$\frac{1}{5}$–$\frac{1}{4}$ in. long; bracteoles 2, foliaceous, ovate, acuminate, hairy, ciliate, $\frac{1}{6}$ in. long. Calyx $\frac{1}{6}$ in. long, glabrous; lobes 5, ovate, $\frac{1}{10}$ in. long, subacute. Corolla divided to the base, the segments scarcely connate; petals $\frac{1}{4}$ in. long, oblong, obtuse, either 5 in one series or 6, 7 or even 8 in two series. Filaments united in bundles attached to the very base of the petals. Style thick, with a ring of hairs and orange-colored glands at the base. Fruit ovoid-oblong, $\frac{1}{2}$ by $\frac{1}{4}$ in., dark-blue (becoming dirty-yellow when dry), surmounted by the distinct calyx-lobes. Talb. Trees, Bomb. ed. 2, p. 214; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164. *Symplocos reticulata*, C. B. Clarke, in Hook. f. Fl. B. I. l. c. (a misprint for *Symplocos racemosa*); Brand (*Symploc.*), in Engl. Pflanzenreich (1901) p. 59. *S. racemosa*, Grah. Cat. p. 104 (*not* of Roxb.). *Hopea racemosa*, Dalz. & Gibs. p. 140.—Flowers: Nov.-Jan. VERN. *Lenda.*

KONKAN: *Stocks*!, *Law*!; Amboli Ghát, *Kanitkar*! DECCAN: Mahableshwar, *H. M. Birdwood*, *Cooke*!, *Woodrow*! S. M. COUNTRY: Belgaum, *Law*!; Chorla Ghát, *Dalzell*!; Castlerock, *Bhiva*! KANARA: *Law*!; Supa, *Ritchie*, 1826!; N. Kanara, *Talbot*.—DISTRIB. India (W. Peninsula).

In the 'Flora of British India' there is an evident misprint, *S reticulata* having been erroneously substituted for *S. racemosa*, which is Graham's citation (*l. c.*). Both the 'Index Kewensis' and Brand, in Engl. Pflanzenreich (*l. c.*), have adopted the erroneous citation, and have given *S. reticulata*, J. Grah. Cat. Bo. Pl. p. 104, as a species, whereas no such species exists.

3. **Symplocos kanarana,** *Talb. in Journ. Bomb. Nat. Hist. Soc.* v. 11 (1897) p. 238, t. 9. A small tree. Leaves 3–6 by 1–2½ in., ovate, long-acuminate, crenate-serrate, chartaceous, glabrous, shining above; main nerves 5 pairs; petioles $\frac{1}{3}$ in. long. Flowers in short axillary spikes. Fruit ovoid, smooth, ridged, 1¼ by ½ in.; stone 1 in. long, with 6 very deep longitudinal furrows and sharp narrow ridges between, rough, surrounded by a copious olive-green pulp; when dry the fruit turns yellow and becomes obtusely angled. Talb. Trees, Bomb. ed. 2, p. 214.

KANARA: evergreen forests of the Sirsi subdivision of N. Kanara, in fruit in May, *Talbot*, 3673!

There is but 1 specimen of the plant (in fruit) in Herb. Kew. The deep furrows of the stone are remarkable. The description has been taken from that by Mr. Talbot (*l. c.*), who has not as yet found a flowering specimen.

4. **Symplocos Stocksii,** *Brand* (*Symploc.*), *in Engl. Pflanzenreich* (1901) p. 59. A tree; young branches hirsute. Leaves 4–6 by 1½–2¼ in., elliptic, serrate, quite glabrous on both sides, shortly apiculate, base cuneate. Spikes rusty-pubescent, 4–6 times as long as the petiole. Bracts hirsute, the middle one ovate, the lateral lanceolate, all of the same length and equalling or overtopping the calyx. Calyx glabrous; lobes rounded, slightly longer than the tube. Corolla twice as long as the calyx, 5–6-partite. Stamens about 80, scarcely longer than the corolla. Ovary puberulous. Fruit unknown.

Brand described this species from a specimen collected by Stocks in the Konkan and ticketed *S. Gardneriana*. There are no specimens in Herb. Kew., and the fruit has not been seen by Brand. From Brand's description the plant seems to be very close to if not actually *S. Beddomei*, the corolla of which is often 6-partite, and of which Brand had apparently seen only 1 specimen.

Order LXXX. OLEACEÆ.

Trees or shrubs, the latter often scandent. Leaves opposite (rarely alternate or verticillate), simple or 3-few-foliolate, entire or toothed; stipules 0. Flowers hermaphrodite, often dimorphous (rarely dicœcious or polygamous), regular, in terminal or axillary cymes or panicles (rarely fascicled or racemose). Calyx free (rarely 0), usually small, campanulate, truncate or 4 (sometimes 5–9) -lobed. Corolla usually gamopetalous (rarely 4–9-petalled or 0); tube long or short; lobes or petals 4–12, imbricate or induplicate-valvate in bud. Stamens usually 2 (in Indian species), inserted on the corolla or (in the polypetalous or apetalous genera) hypogynous; filaments usually short; anthers rather large, ovate-oblong (rarely linear), dehiscing on the margin or subextrorsely. Ovary free, 2-celled; ovules 1–2 (rarely 3–4) in each cell, attached to the inner angle near the apex or base; style usually short; stigma simple or 2-lobed. Fruit capsular, loculicidally 2-valved or indehiscent, or a berry or a drupe. Seeds solitary or 2 in each cell, erect or pendulous; testa usually thin; albumen fleshy or horny, often oily or 0; embryo straight; radicle inferior or superior.—Distrib. Throughout the tropical and temperate regions of the world; genera 18; species about 280.

Corolla-lobes imbricate.	
Seeds erect; radicle inferior.	
Shrubs usually scandent; fruit of 2 berry-like carpels, one carpel sometimes wanting	1. Jasminum.
An erect large shrub or small tree; fruit a bipartite compressed capsule	2. Nyctanthes.
Seeds pendulous, winged; radicle superior.	
Fruit a woody pyriform loculicidally dehiscent capsule	3. Schrebera.
Corolla-lobes valvate.	
Corolla of distinct petals, free or connate in pairs	4. Linociera.
Corolla tubular or 0; inflorescence axillary	5. Olea.
Corolla infundibuliform; inflorescence terminal	6. Ligustrum.

1. JASMINUM, Linn.

Branched shrubs, erect or scandent. Leaves opposite (rarely alternate), simple, 3-foliolate or imparipinnate. Flowers often handsome, in cymes at the ends of the branches (rarely solitary). Calyx 4–9-toothed or -lobed or almost -partite. Corolla hypocrateriform, white, pink or yellow; tube narrow; lobes 4–12, spreading, imbricate in bud. Stamens 2, included in the corolla-tube; filaments very short; anthers attached at the back near the base, the connective usually mucronate. Ovary 2-celled; ovules usually 2 in each cell, attached near the base; style cylindric; stigma at length usually 2-fid. Berry didymous or often by suppression simple; carpels globose, ellipsoid or elongate. Seed usually solitary in each carpel, erect; albumen 0; cotyledons plano-convex; radicle inferior.—Distrib. Asia, Africa, and Australia, 1 species indigenous in S. Europe, many species cultivated in various countries; species about 90.

Leaves simple.
Calyx pubescent.
Calyx-teeth in flower twice the length of the tube or longer.
A suberect shrub ..... 1. *J. Sambac.*
Climbing shrubs.
Bracts linear-subulate ..... 2. *J. malabaricum.*
Bracts foliaceous.
Velvety-pubescent; bracts green or 0 ..... 3. *J. pubescens.*
Fulvous hairy; bracts white ..... 4. *J. Rottlerianum.*
Calyx-teeth in flower less than twice as long as the tube.
Calyx-teeth linear, subelavate ..... 5. *J. arborescens.*
Calyx-teeth minute, narrowly triangular ..... 6. *J. Roxburghianum.*
Calyx glabrous; tube more or less ribbed ..... 7. *J. Ritchiei.*
Leaves compound (trifoliolate).
Lateral leaflets very small, sometimes wanting ..... 8. *J. auriculatum.*
Lateral leaflets nearly as large as the terminal ..... 9. *J. flexile.*

1. **Jasminum Sambac,** *Ait. Hort. Kew.* v. 1 (1789) p. 8. A suberect shrub, scarcely climbing; young branches pubescent. Leaves opposite, membranous, 1½–4½ by ⅞–2½ in., variable in shape, usually broadly ovate or elliptic, acute, obtuse or acuminate, entire, glabrous or nearly so, base rounded or subcordate, rarely acute; main nerves 4–6 pairs; petioles ⅛–¼ in. long, hairy. Flowers white, very fragrant, solitary or usually in 3-flowered (many-flowered in cultivation) terminal cymes; bracts linear-subulate; pedicels ¼ in. long, hairy. Calyx ⅜–½ in. long, hairy; teeth 5–9, linear-subulate, ¼–⅜ in. long. Corolla-tube ½ in. long; lobes as long as the tube, narrowly oblong, acute or obtuse (in cultivation orbicular, *Clarke*). Ripe carpels 1–2, subglobose, ¼ in. in diam., black, surrounded by the suberect calyx-teeth. Fl. B. I. v. 3, p. 591; Grah. Cat. p. 110; Dalz. & Gibs. p. 137; Wight, Icon. t. 704; Talb. Trees, Bomb. ed. 2, p. 216; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prodr. v. 4, p. 544.—Flowers more or less throughout the year. VERN. *Bat-mogará.*

Throughout the Presidency, widely cultivated, doubtfully wild. Often found in waste places near villages.

The plant, of which the flowers are much valued for their fragrance, is known as the *Arabian* or *Tuscan* Jasmine. It becomes somewhat variable under cultivation.—DISTRIB. Cultivated throughout India and in the tropics of both hemispheres.

2. **Jasminum malabaricum,** *Wight, Icon.* t. 1250 (1850). A large climbing shrub; stem sometimes as thick as a man's arm. Leaves opposite, membranous, 3–4½ by 2–2½ in., broadly ovate, acuminate, entire, glabrous, base rounded, sometimes cordate; main nerves about 8 or 9 pairs; petioles ½–1 in. long, jointed a little above the base, glabrous. Flowers white, fragrant, in lax trichotomous compound many-flowered (sometimes 40–50) terminal cymes; bracts ¼–⅜ in. long, linear-subulate; pedicels ⅛–¼ in. long, pubescent. Calyx ⅛ in. long, pubescent; teeth 5–7, subulate from a slightly broader base, usually reflexed, ⅛ in. long, hairy. Corolla glabrous; tube ¾–⅞ in. long; lobes 6–10, oblong or lanceolate, ¾ in. long, very acute. Fl. B. I. v. 3, p. 594. *Jasminum arborescens,* Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164. *J. latifolium,* Grah. Cat. p. 110; Dalz. & Gibs. p. 138 (*not* of Roxb.). *J. arborescens,* var. *latifolia,* Talb. Trees, Bomb. ed. 2, p. 216 (*not* of C. B. Clarke).—Flowers: Mar.–May. VERN. *Kusar.*

Konkan: *Law*!; Matheran, *Cooke*!; Elephanta, *Graham*; Kanheri jungles, *Graham*. Deccan: Mahableshwar, common, *Cooke*!, *Graham*. Kanara: moist forests of N. Kanara, common, *Talbot*.—Distrib. India (W. Peninsula).

This plant has been long considered in Bombay to be the *Jasminum latifolium* of Roxburgh, but a comparison of Wight's figure of that plant (t. 703) with that of *J. malabaricum* (t. 1250) will at once shew the difference between the two. The mistake appears to have originated with J. Graham, who assumed the Bombay plant to be *J. latifolium*, Roxb. Wight at the time (1839) had not described *J. malabaricum*, which he did in 1850. Dalzell & Gibson perpetuated Graham's mistake, which has hitherto remained uncorrected.

3. **Jasminum pubescens,** *Willd. Sp. Pl.* v. 1 (1797) p. 37. A scandent shrub; young branches clothed with velvety pubescence or tomentum. Leaves opposite, 1½–2¾ by ⅝–1½ in., ovate, acute, often mucronate, softly pubescent or tomentose on both surfaces, often at length glabrate above, base rounded or often cordate; main nerves 4–6 pairs; petioles ¼–⅜ in. long, densely villous. Flowers white, sessile, in dense terminal capitate cymes often at the extremities of short axillary branches; bracts large, ovate, acute, foliaceous, green. Calyx ½–⅝ in. long, densely fulvous-villous; teeth ⅓–½ in. long, subulate, fulvous-hairy. Corolla glabrous; tube ¾–⅞ in. long; lobes 6–9, elliptic-oblong, acute, often mucronate, ½ in. long. Carpels 1–2, globose, ¼ in. in diam., black, surrounded by the suberect calyx-teeth. Fl. B. I. v. 3, p. 592; Grah. Cat. p. 110; Dalz. & Gibs. p. 138; Talb. Trees, Bomb. ed. 2, p. 216; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 4, p. 544. *Jasminum hirsutum*, Willd. l. c. p. 36; Wight, Icon. t. 702. *J. bracteatum*, Roxb. Hort. Beng. p. 3; Dalz. & Gibs. p. 138.—Flowers: Dec.–Feb. Vern. *Rán-mogará.*

Konkan: *Nimmo ex Graham, Dalzell & Gibson*; Mumbra near Tanna, *Cooke*!, *Woodrow*. S. M. Country: near Belgaum, *Ritchie*, 1838! Kanara: moist forests of N. Kanara, *Talbot*.—Distrib. Throughout India, often cultivated in gardens; China.

4. **Jasminum Rottlerianum,** *Wall. Cat.* 2865. A scandent fulvous-hairy shrub; branches terete, velvety. Leaves opposite, 1¾–4 by 1–1¾ in., elliptic, acute or acuminate, softly hairy on both surfaces or glabrate above, base usually rounded; main nerves about 6 pairs; petioles ⅛–¼ in. long, jointed in the middle, densely villous. Flowers white, in terminal cymes; peduncles hairy, usually 3, each bearing a small fascicle of flowers at the apex; pedicels ¼–½ in. long, stout, hairy; bracts white, ⅜–⅝ in. long, lanceolate, acuminate, more or less pubescent, ciliate. Calyx ⅓ in. long, hairy; teeth ¼ in. long, subulate, hairy. Corolla glabrous; tube ¾–1 in. long; lobes 5–7, oblong, obtuse, apiculate, ½ in. long. Fruit ellipsoid, ½ by ⅓ in., smooth, black. Fl. B. I. v. 3, p. 593; Dalz. & Gibs. p. 138; Wight, Icon. t. 1249; Talb. Trees, Bomb. ed. 2, p. 216.—Flowers: Jan.–Mar.

Konkan: Sivapur jungles, Wari country, *Dalzell & Gibson*. Kanara: common in the evergreen forests of N. Kanara, *Talbot*; 10 miles west of Supa, *Ritchie*, 1837!—Distrib. India (W. Peninsula).

5. **Jasminum arborescens,** *Roxb. Hort. Beng.* (1814) p. 3. A large shrub (climbing in the var. *latifolia*); branchlets hairy. Leaves opposite, 3–4½ by 1½–2 in., ovate, acute or acuminate, pubescent or tomentose when young, often glabrous when mature, base rounded or cordate, sometimes truncate; main nerves 6–8 pairs; petioles ¼–½ in. long. Flowers white, in lax trichotomous 12–20-flowered terminal

hairy cymes; bracts linear-subulate, $\frac{1}{4}$–$\frac{1}{2}$ in. long; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long. Calyx hairy; teeth $\frac{1}{10}$–$\frac{1}{6}$ in. long, linear, subclavate. Corolla glabrous; tube $\frac{3}{8}$–$\frac{1}{2}$ in. long; lobes 10 or 12, linear-lanceolate, acute, $\frac{1}{2}$–$\frac{5}{8}$ in. long. Carpels usually solitary, ellipsoid, $\frac{1}{2}$ by $\frac{1}{4}$–$\frac{1}{3}$ in., unsymmetric, black. Fl. B. I. v. 3, p. 594; Wight, Icon. t. 699; Watt, Dict. Econ. Prod. v. 4, p. 541.

I doubt much if this plant or its var. *latifolia*, C. B. Clarke, is to be found wild within the limits of the Bombay Presidency. It has not, as far as I know, been found there by any plant-collector. There is in Herb. Kew. a specimen collected by Stocks from a *garden* in Sind and another specimen by the same collector marked "Herb. Stocks," but without any locality assigned to it. This specimen may or may not have been obtained from the same place as the former. Again, there is a specimen from Dalzell ticketed "cultivated in Sind," and another scrap from the same collector without any locality assigned.

6. **Jasminum Roxburghianum,** *Wall. Cat.* (1828) 2870. A villous climbing shrub; branchlets softly pubescent. Leaves opposite, 1–5 by $\frac{7}{8}$–$2\frac{3}{4}$ in., ovate, acute (rarely acuminate), softly pubescent on both sides; base rounded or shortly subcuneate; main nerves 6–8 pairs; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long, densely pubescent. Flowers in lax trichotomous densely villous many-flowered cymes; bracts subulate, hairy; pedicels $\frac{1}{8}$–$\frac{1}{2}$ in. long, villous. Calyx $\frac{1}{8}$–$\frac{1}{6}$ in. long, densely villous; teeth small or minute, narrowly triangular. Corolla glabrous; tube $\frac{1}{4}$–$\frac{3}{8}$ in. long; lobes $\frac{3}{8}$–$\frac{1}{2}$ in. long, linear, acute. Carpel usually solitary, $\frac{1}{2}$ by $\frac{1}{4}$ in., ellipsoid, smooth, black. Fl. B. I. v. 3, p. 595; Talb. Trees, Bomb. ed. 2, p. 216.—Flowers: Mar.–May.

Perhaps only a villous variety of *Jasminum arborescens*, Roxb.

KANARA: deciduous forests of N. Kanara near Sambrani, Haliyal taluka, *Talbot*; Kála naddi, *Ritchie*, 1840!—DISTRIB. India (W. Peninsula).

7. **Jasminum Ritchiei,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 3 (1882) p. 598. A climbing branched shrub, glabrous or nearly so. Leaves opposite, $1\frac{1}{2}$–$4\frac{1}{2}$ by $\frac{3}{4}$–$1\frac{3}{4}$ in., elliptic, acuminate, glabrous above, glabrous or hairy on the nerves beneath, base cuneate; main nerves 4–5 pairs, often tufted in the axils; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long. Flowers white, in few (3–9)-flowered, very lax, often subpaniculate cymes; bracts linear-subulate, $\frac{1}{4}$ in. long; pedicels $\frac{1}{2}$–1 in. long. Calyx $\frac{1}{5}$ in. long; tube campanulate, more or less ribbed, glabrous; teeth $\frac{1}{12}$–$\frac{1}{8}$ in. long, linear or sometimes subtriangular, often ciliate. Corolla glabrous; tube $\frac{5}{8}$–$\frac{3}{4}$ in. long; lobes $\frac{3}{8}$–$\frac{1}{2}$ in. long, linear, acute. Carpels solitary, $\frac{1}{3}$ in. in diam., almost accurately spherical. Talb. Trees, Bomb. ed. 2, p. 216; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164.—Flowers: Aug.–Sept.

S. M. COUNTRY: Belgaum, *Stocks*!; Belgaum south, *Ritchie*, 444!; Castlerock, *Woodrow*. KANARA: evergreen forests of N. Kanara, common on the Ghâts from Ainshi southwards, *Talbot*; Chandavar, *Woodrow*; Supa, *Ritchie*, 1839!—DISTRIB. India (W. Peninsula).

8. **Jasminum auriculatum,** *Vahl, Symb. Bot.* v. 3 (1794) p. 1. A scandent shrub more or less pubescent or velvety, sometimes nearly glabrous. Leaves 3-foliolate, the 2 lateral leaflets very small, often wanting, the central leaflet $\frac{3}{4}$–$1\frac{1}{4}$ by $\frac{3}{8}$–$\frac{5}{8}$ in., broadly ovate or sometimes nearly orbicular, acute, acuminate, or rounded, often apiculate at the apex, velvety-pubescent or glabrous, base usually rounded; main nerves

few, inconspicuous; petioles very short. Flowers white, in compound, many-flowered, pubescent, lax, corymbose cymes; bracts $\frac{1}{8}$–$\frac{1}{6}$ in. long, linear-lanceolate, acute; pedicels $\frac{1}{8}$–$\frac{1}{4}$ in. long. Calyx $\frac{1}{6}$ in. long, pubescent; teeth minute (about $\frac{1}{50}$–$\frac{1}{40}$ in. long), oblong, obtuse. Corolla glabrous; tube $\frac{1}{2}$ in. long; lobes 5–7, elliptic-oblong, acute, $\frac{1}{4}$ in. long. Carpel solitary, $\frac{1}{5}$ in. in diam., globose, black. Fl. B. I. v. 3, p. 600; Grah. Cat. p. 111; Wight, Icon. t. 700; Trim. Fl. Ceyl. v. 3, p. 115; Talb. Trees, Bomb. ed. 2, p. 217; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164. *Jasminum affine* *, Wight, Icon. t. 1255. *J. ovalifolium* *, Wight, Icon. t. 1256.—Flowers: July–Oct. VERN. *Jai.*

KONKAN: *Stocks*! S. M. COUNTRY: Belgaum hills, north-east, *Ritchie*, 439!; Badami, *Bhiva*! SIND: cultivated (fide *C. B. Clarke*).—DISTRIB. India (W. Peninsula); Ceylon.

9. **Jasminum flexile,** *Vahl, Symb. Bot.* v. 3 (1794) p. 1. An extensive climber; branches quite glabrous. Leaves opposite, 3-foliolate, usually drying yellow; common petioles $\frac{1}{2}$–$1\frac{1}{8}$ in. long. Terminal leaflets 2–5 by 1–2 in., elliptic-oblong or oblong-lanceolate, acute or acuminate, glabrous, usually with undulate margins, base rounded or subacute; main nerves about 6 pairs; petiolules $\frac{3}{4}$–1 in. long. Lateral leaflets somewhat smaller than, but otherwise as the terminal; petiolules $\frac{1}{8}$–$\frac{1}{4}$ in. long. Flowers large, white, in copious lax paniculate axillary cymes; bracts $\frac{1}{8}$–$\frac{1}{6}$ in. long, linear, acute; peduncles glabrous, 1 in. long; pedicels $\frac{1}{10}$–$\frac{1}{4}$ in. long, glabrous. Calyx glabrous, $\frac{1}{10}$–$\frac{1}{8}$ in. long; teeth minute, triangular. Corolla-tube 1 in. long; lobes $\frac{1}{2}$–$\frac{5}{8}$ in. long, elliptic, obtuse or acute. Carpels stalked, broadly ovoid, $\frac{5}{8}$ in. long, dark-purple. Fl. B. I. v. 3, p. 601; Wight, Icon. t. 1253; Trim. Fl. Ceyl. v. 3, p. 115; Talb. Trees, Bomb. ed. 2, p. 217; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164.—Flowers: Mar.

KANARA: evergreen forests of the southern Ghâts of N. Kanara, common, *Talbot*; road from Kumpta to Sirsi, *Woodrow*!; near Honavar, *Kanitkar*!—DISTRIB. India (W. Peninsula), apparently endemic.

Jasminum humile, Linn. Sp. Pl. (1753) p. 7. An erect rigid ramous shrub, not indigenous in the Bombay Presidency though found in Southern India and Ceylon. Cultivated in gardens. The leaves are alternate, trifoliolate or pinnate, the branches angular and the flowers yellow. Fl. B. I. v. 3, p. 602; Woodr. Gard. in Ind. ed. 5, p. 374; Watt, Dict. Econ. Prod. v. 4, p. 543.—VERN. *Hemapupika.*

Jasminum odoratissimum, Linn. Sp. Pl. (1753) p. 7. A climbing shrub, a native of Madeira, cultivated in gardens. Leaves alternate, ternate and pinnate. Flowers yellow with 5 oblong obtuse corolla-lobes. Grah. Cat. p. 111; Dalz. & Gibs. Suppl. p. 51.

Jasminum officinale, Linn. Sp. Pl. (1753) p. 7. The common white Jasmine. Native of Kashmir, Afghanistan, and Persia, cultivated in India, China, Europe, &c. Leaves opposite, pinnate. Flowers white, very fragrant; corolla-lobes 4 or 5. Fl. B. I. v. 3, p. 603; Woodr. in

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* These are dimorphic forms of the plant.

Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 4, p. 544.—VERN. *Jai.*

Jasminum grandiflorum, Linn. Sp. Pl. ed. 2 (1762) p. 9. A large subscandent shrub, wild in the subtropical North-west Himalayas, often cultivated in gardens throughout India. Very like *J. officinale*, but differing in the equal size of the leaflets and larger flowers. Flowers white, reddish underneath. Fl. B. I. v. 3, p. 603; Woodr. Gard. in India, ed. 5, p. 375; Watt, Dict. Econ. Prod. v. 4, p. 542. *Jasminum aureum*, Don, Prodr. Fl. Nep. p. 106; Dalz. & Gibs. Suppl. p. 51.—VERN. *Chameli*; *Jati-Jai.*

This plant, known as the *Spanish Jasmine*, supplies most of the jasmine used in perfumery. It is largely cultivated near Cannes in the south of France. See Watt, Dict. Econ. Prod. l. c.

Jasminum calophyllum, Wall. Cat. (1828) 2889. A very beautiful shrub of slightly scandent habit, a native of the Nilghiris. Leaves opposite and alternate, 3-foliolate. Flowers pure white, 1 in. across; corolla 10-lobed. This plant is grown with fine effect in the Public Park, Baroda (*Woodrow*). Fl. B. I. v. 3, p. 602; Woodr. Gard. in Ind. ed. 5, p. 375.

2. **NYCTANTHES,** Linn.

Shrubs or small trees. Leaves opposite, entire or toothed. Flowers sessile, in pedunculate heads involucrate with ovate bracts; peduncles axillary and terminal. Calyx narrowly campanulate or subcylindric, truncate or indistinctly toothed, finally splitting or deciduous. Corolla hypocrateriform; tube cylindric, orange; lobes 4–8, contorted in bud, spreading. Anthers 2, subsessile near the top of the corolla-tube. Capsule chartaceous, much-compressed, parallel to the partition, separating when ripe into two 1-seeded cells. Seed erect, flattened; testa thin; albumen 0; cotyledons flat; radicle inferior.—DISTRIB. Species 2, of which one is East Indian and the other Sumatran.

1. **Nyctanthes Arbor-tristis,** *Linn. Sp. Pl.* (1753) p. 6. A large shrub or small tree rough all over with stiff whitish hairs; young branches sharply quadrangular, hairy. Leaves opposite, 2–4 by 1–2½ in., ovate, acute or acuminate, rough and scabrous above with short bulbous hairs, densely pubescent beneath with appressed hairs, entire or with a few large distant teeth, base rounded or slightly cuneate; main nerves few, conspicuous beneath; petioles ¼ in. long, hairy. Flowers delightfully fragrant, sessile in pedunculate bracteate fascicles of 3–5; peduncles 4-angled, slender, hairy, axillary and solitary and in terminal short trichotomous cymes; bracts broadly ovate or suborbicular, ¼–⅜ in. long, apiculate, hairy on both sides. Calyx ¼–$\frac{5}{16}$ in. long, narrowly campanulate, hairy outside, glabrous inside, truncate or obscurely toothed or lobed, ciliate. Corolla glabrous, rather more than ½ in. long; tube ¼–$\frac{5}{16}$ in. long, orange-colored, about equalling the limb; lobes white, unequally obcordate, cuneate. Capsule ¾ in. long and broad, obcordate or nearly orbicular, compressed, 2-celled, separating into 2 flat 1-seeded carpels, reticulately veined, glabrous. Fl. B. I. v. 3, p. 603; Grah. Cat. p. 111; Dalz. & Gibs. Suppl. p. 51; Bot. Mag. t. 4900; Bedd. Flor. Sylvat.

t. 240; Talb. Trees, Bomb. ed. 2, p. 217; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 5, p. 434.—Flowers more or less throughout the year. VERN. *Har*; *Shiuli*; *Párijátak*.

It is doubtful if this plant is truly wild in the Bombay Presidency; indeed Roxburgh says that he has never met it at all except in a cultivated state. Dalzell says he recollects to have seen it wild in the Satpura forests near Arawad in Khandesh, whence it has also been obtained by Woodrow. It is very widely cultivated and is found in most gardens in the Presidency. The flowers come out in the evening and fall off in the early morning. They may be collected in large quantity on the ground beneath the shrubs. They have a delicate honey-like scent. The leaves are very rough and used as sandpaper for polishing wood.

3. **SCHREBERA,** Roxb.

Glabrous trees. Leaves opposite, imparipinnate; leaflets opposite. Flowers in terminal 2–3-chotomous cymes. Calyx campanulate, truncate or unequally 4–6-toothed. Corolla hypocrateriform; tube cylindric; lobes 4–7, spreading, imbricate in bud. Stamens 2, inserted near the apex of the tube; filaments short; anthers included in the tube or shortly exserted. Ovary 2-celled; ovules 3–4 in each cell, pendulous from its apex; style cylindric, elongate; stigma shortly 2-fid. Capsule woody, obovoid, 2-celled, loculicidally 2-valved. Seeds pendulous, winged; albumen 0; cotyledons fleshy, longitudinally plaited; radicle short, superior.—DISTRIB. Species 4, of which 1 is East Indian, the others African.

1. **Schrebera swietenioides,** *Roxb. Cor. Pl.* v. 2 (1798) p. 1, t. 101. A moderate-sized tree 40–50 ft. high, with erect trunk and numerous branches; bark ash-colored, scabrous. Leaves opposite or nearly so, imparipinnate, 9–12 in. long (including the common petiole which is 2–3 in. long); leaflets 7–9, opposite; leaf-rhachis pubescent, at length nearly glabrous. Leaflets 2–4 by 1–2 in., the lowest pair often smaller than the others, ovate, acute or acuminate, glabrous when mature, base often unequal-sided; main nerves 6–8 pairs; petiolules of lateral leaflets short, those of the terminal leaflets ½–1¼ in. long. Flowers yellowish-brown, fragrant at night (*Roxb.*), numerous, in trichotomous cymes 3–7 in. long and broad; bracts linear, obtuse, pubescent; pedicels 0–½ in. long, pubescent. Calyx ⅛ in. long, pubescent; limb with 5 distinct or obscure teeth, often splitting so as to become 2-lipped. Corolla ½ in. long; tube ⅓ in. long, glabrous outside; lobes elliptic-oblong, obtuse, the central portion of each covered inside with brown glandular raised specks, the margins glandular-ciliate. Stamens inserted near the top of the corolla-tube; filaments very short. Style cylindric, slightly longer than the corolla-tube; stigma shortly bifid. Capsule pear-shaped, pendulous, 2 in. long, very hard and woody, dotted with white scabrous specks. Seeds 3–4 in each cell, winged; cotyledons contorted. Fl. B. I. v. 3, p. 604; Grah. Cat. p. 112; Dalz. & Gibs. p. 138; Bedd. Fl. Sylvat. t. 248; Talb. Trees, Bomb. ed. 2, p. 218; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 6, part 2, p. 488.—Flowers: Apr.–May. VERN. *Mokhá*; *Mokiri*; *Goki*.

KONKAN: *Dalzell*!; Thal Ghát near Bhewndi, *Graham*. DECCAN: Bowdhan 8 miles W. of Poona, *Bhiva*!; Chattersinghi hill near Poona, *Kanitkar*!; Gokak, *Ritchie*,

1865! S. M. Country: Padshapur, *Ritchie*, 1865! Kanara: common locally in N. Kanara, *Talbot*.—Distrib. India (Tropical Himalaya, Central and S. India and Birma).

The leaves are eaten as a vegetable in time of scarcity. The wood is white, close-grained, and excellent for turners.

4. **LINOCIERA**, Swartz.

Shrubs or trees. Leaves opposite, entire. Flowers in axillary or extra-axillary (rarely terminal) panicles or cymes; bracts at the divisions small. Calyx small, 4-fid or 4-toothed. Petals 4, long or short, nearly free or cohering in pairs or very shortly connate, induplicate-valvate in bud. Stamens 2; filaments short or 0; anthers elliptic, dehiscing on the margin. Ovary 2-celled; ovules 2 in each cell, pendulous from its apex; style short; stigma bifid or entire. Drupe ellipsoid; endocarp bony or crustaceous. Seed usually solitary, pendulous; testa thin; albumen fleshy or 0; radicle superior.—Distrib. Tropics of both hemispheres; species 40.

Seeds albuminous; petals ¼ in. long; ovary hairy ..... 1. *L. malabarica.*
Seeds exalbuminous; petals ⅛ in. long; ovary glabrous ..... 2. *L. intermedia.*

1. **Linociera malabarica,** *Wall. Cat.* (1828) 2828. A small tree; bark smooth, shining, grey, covered with raised corky dots. Leaves coriaceous, glabrous, 2–5 by 1–2 in., elliptic-oblong, obtuse or suddenly narrowed to a small blunt acumen, margins more or less revolute, base cuneate; main nerves inconspicuous; petioles ¼–½ in. long, channelled above, rugose, glabrous. Flowers yellowish-white with an odor of ripe apples (*Law*), axillary; peduncles fascicled (rarely paniculate), grey-pilose, each bearing a small fascicle of 1–5 sessile flowers at the apex; bracts minute, hairy. Calyx $\frac{1}{16}$ in. long, hairy; lobes about $\frac{1}{30}$ in. long, ovate, acute. Corolla ¼ in. long; petals cohering at the very base in pairs, linear-lanceolate, acute, glabrous. Anthers sessile, 1 at the base of each pair of connate petals. Ovary hairy; style scarcely any; stigma usually shortly bifid. Drupe ⅓–½ by ¼–⅓ in., ellipsoid; cotyledons flat, in fleshy albumen. Fl. B. I. v. 3, p. 607; Grah. Cat. p. 109; Dalz. & Gibs. p. 159; Wight, Icon. t. 1246; Talb. Trees, Bomb. ed. 2, p. 218; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164.—Flowers: Nov.–Feb. Vern. *Heddi.*

Konkan: evergreen forests, *Talbot*; Ambeghát, *Kanitkar*! Deccan: Khandala, *Graham, Dalzell & Gibson*; Lanoli, *Woodrow*. S. M. Country: Rámghát, *Law* ex *Graham, Dalzell & Gibson, Ritchie*, 1835!; near Hubli, *Hohenhacker*, 752! Kanara: evergreen forests of N. Kanara, *Talbot*; Gairsoppa, *Dalzell*!; Mulas, *Ritchie*, 1835! —Distrib. India (W. Peninsula).

2. **Linociera intermedia** var. **Roxburghii,** *C. B. Clarke, in. Hook. f. Fl. B. I.* v. 3 (1882) p. 609. A small handsome tree. Leaves 3½–6 by 1¼–2 in., elliptic-oblong, acute or acuminate, glabrous, base very acute, running down into the petiole; main nerves about 10, slender, prominent beneath; petioles ⅜–1 in. long. Flowers white, in axillary or extra-axillary, lax, many-flowered panicles 1½–2½ in. long; bracts lanceolate; pedicels $\frac{1}{20}$–$\frac{1}{10}$ in. long. Calyx $\frac{1}{16}$ in. long, glabrous; lobes ovate. Corolla ⅛ in. long; lobes 4, linear-oblong, subobtuse, obscurely united in pairs at the base. Ovary glabrous; stigma deeply 2-fid with divaricate lobes. Drupe ⅜–½ in. long, ellipsoid, purple when ripe. Seed exalbuminous. Talb. Trees, Bomb. ed. 2, p. 218; Woodr.

in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 4, p. 643. *Olea paniculata*, Roxb. Hort. Beng. p. 80 (*not* of R. Br.). *Olea Roxburghii* (sp.), Spreng. Neue Entdeck. v. 3 (1822) p. 78; Wight, Icon. t. 735 (*not* of Wall.). *Olea Roxburghiana*, Rœm. & Schult. Mant. v. 1 (1822) p. 77; Dalz. & Gibs. p. 159.

KONKAN: common on the Ghâts, *Dalzell & Gibson*. DECCAN: Lanoli, *Woodrow*.

This tree is said by Dalzell & Gibson (*l. c.*) to be common on the Ghâts. It is, however, far from common, but, on the contrary, rare.—DISTRIB. India (Orissa and Circars, Chota Nagpore, Siwaliks, W. Peninsula).

5. **OLEA,** Linn.

Trees or shrubs. Leaves opposite, entire or toothed. Flowers small, hermaphrodite, dicœcious or polygamous, in axillary or extra-axillary (rarely terminal) panicles. Calyx short, 4-toothed or 4-fid. Corolla-tube usually short; lobes 4, induplicate-valvate, or 0. Stamens usually 2, inserted on the corolla-tube (in male flowers sometimes hypogynous); filaments short; anthers oblong. Ovary 2-celled; ovules 2 in each cell, attached laterally to the septum or subpendulous; style short; stigma capitate or bifid. Drupe ellipsoid or subglobose; endocarp bony or crustaceous. Seed usually solitary, pendulous; albumen usually fleshy; radicle short, superior.—DISTRIB. South Africa, India, Australia, and Polynesia; species about 35.

1. **Olea dioica,** *Roxb. Hort. Beng.* (1814) p. 3. A small or moderate-sized glabrous tree; bark grey, smooth. Leaves coriaceous, 3–5 by $1\frac{1}{4}$–2 in., elliptic-lanceolate, acute or acuminate, entire or distantly and sharply serrate, waved, glabrous, base acute, running down into the petiole; main nerves 8–10, slender, conspicuous beneath; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers polygamo-dicœcious (male and hermaphrodite) in compound panicles 1–3 in. long, which are axillary or leaf-opposed or from below the leaves, the male panicles rather larger and more dense than the hermaphrodite ones. MALE FLOWERS: Calyx $\frac{1}{25}$ in. long, glabrous; lobes triangular, acute, $\frac{1}{30}$ in. long. Corolla $\frac{1}{8}$ in. long; lobes $\frac{1}{30}$ in. long, triangular-ovate, subacute. Filaments short. HERMAPHRODITE FLOWERS: Calyx and corolla as in the male; stamens usually 2 (sometimes 3); filaments inserted on the corolla or sometimes on the ovary (*epigynous*). Drupe $\frac{1}{2}$–$\frac{2}{3}$ in. long, ellipsoid, often slightly pointed, purple and covered with a whitish powdery bloom when ripe. Seed ellipsoid, shortly pointed, rugose, glabrous, intensely bitter to the taste; testa thin; cotyledons oblong-elliptic, flat. Fl. B. I. v. 3, p. 612; Grah. Cat. p. 109; Dalz. & Gibs. p. 159; Roxb. Fl. Ind. v. 1, p. 106; Wight, Illustr. t. 151; Talb. Trees, Bomb. ed. 2, p. 219; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 5, p. 484.—Flowers: Jan.-Apr. VERN. *Párjámb*; *Karamba*.

Very common all along the Ghâts. KONKAN: *Law!*, *Stocks!*; Matheran very common, *Cooke!* DECCAN: Khandala, *Woodrow*; Mahableshwar, *Cooke*; Lanoli, *Graham*; Phunda Ghât, *Ritchie*, 921! S. M. COUNTRY: Castlerock, *Cooke!* KANARA: evergreen Ghât-forests of N. Kanara, common, *Talbot*; Jagalbet, *Ritchie*, 921!—DISTRIB. India (lower hills of Assam and Bengal, Western Peninsula).

I have found (as has Kurz) that a corolla is present in the female or hermaphrodite flowers of this tree, of which I have examined many living specimens at Matheran, where it is abundant. Roxburgh (Fl. Ind. l. c.) says that the female is probably hermaphrodite, and if so the corolla with the stamens must have fallen off at a very

early period. This is exactly what occurs. The corolla falls off when the ovary is quite minute, taking away 2 (sometimes 3) stamens with it, except where (as is sometimes the case) the stamens are inserted on the ovary itself. Hence the female flowers usually reach Herbaria as small ovaries seated on a calyx without either corollas or stamens.

In the hot season of 1883, when a flight of locusts visited Matheran, the leaves of this tree seemed to possess a greater attraction for them than those of any other tree on the hill.

Olea europæa, Linn. Sp. Pl. (1753) p. 8. The well-known *Olive-tree* of the Mediterranean regions, originally probably a native of Asia Minor and Greece, was apparently first introduced into the Bombay Presidency in 1837 (fide *Graham*). Later, in 1842, Colonel Jervis introduced several varieties of the tree which grew readily and well but rarely flower and never ripen fruit. *Olea sativa*, Hoffmannsegg & Link, Fl. Port. v. 1 (1809) p. 388; Grah. Cat. p. 109; Dalz. & Gibs. Suppl. p. 50; Woodr. Gard. in Ind. ed. 5, p. 373; Watt, Dict. Econ. Prod. v. 5, p. 485.

Olea cuspidata, Wall. Cat. (1828) 2817. A bushy tree about 30 ft. high, a native of the N.W. Himalaya, Kashmir, and Beluchistan. The tree grows freely with ordinary treatment and may be transplanted successfully when of large size. The flowers are small and are rarely produced in the plains. Some botanists consider it a variety of the wild Olive (*Olea europæa*). An oil is extracted from the fruit in Afghanistan, and the fruit is sometimes eaten by the natives of the countries where it abounds, though it is not very palatable. Fl. B. I. v. 3, p. 611; Woodr. Gard. in Ind. ed. 5, p. 373; Watt, Dict. Econ. Prod. v. 5, p. 483.—VERN. *Ráhu*; *Rán*; *Shwán*.

6. **LIGUSTRUM,** Linn.

Shrubs or small trees; branches often lenticellate. Leaves opposite, quite entire. Flowers usually white, in terminal often thyrsoid panicles. Calyx truncate or 4-toothed. Corolla infundibuliform; tube short or long; lobes 4, subinduplicate-valvate. Stamens 2, attached to the tube of the corolla; anthers included or exserted. Ovary 2-celled; ovules 2 in each cell, pendulous; style short or long; stigma thickened. Drupe 1–3-seeded; endocarp chartaceous or thin. Seeds pendulous; testa thin; albumen fleshy; cotyledons flat; radicle short, superior.—DISTRIB. Europe, temperate and tropical Asia and Australia; species 25.

1. **Ligustrum neilgherrense** VAR. **obovata,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 3 (1882) p. 615. A large shrub or small tree; bark of the branches copiously studded with white lenticels. Leaves $1\frac{1}{4}$–3 by $\frac{3}{4}$–2 in., elliptic or slightly obovate, acute, acuminate or obtuse, often mucronate, glabrous, usually sprinkled beneath with minute black dots, base acute; main nerves 5–8 pairs; petioles $\frac{1}{4}$–$\frac{3}{8}$ in. long, channelled above. Flowers white, fragrant, in dense or lax terminal nearly glabrous thyrsoid panicles sometimes reaching 6 in. long and broad; branches of the panicle subquadrangular; pedicels 0–$\frac{1}{16}$ in. long; bracts beneath the pedicels $\frac{1}{16}$–$\frac{1}{10}$ in. long, linear-lanceolate, acute; buds obovoid. Calyx $\frac{1}{16}$ in. long, glabrous (rugose in dried specimens); limb truncate or shortly 4-toothed. Corolla $\frac{1}{4}$ in. long; lobes as long as the

tube, elliptic-oblong, subacute, reflexed. Stamens inserted on the corolla-tube, exserted beyond the extremity of the corolla-lobes. Style as long as the corolla-tube; stigma slightly clavate, obtuse, bifid. Drupe obovoid, ⅜ by ½ in., dark purple and covered with a powdery bloom when ripe. *Ligustrum neilgherrense*, Dalz. & Gibs. p. 159; Talb. Trees, Bomb. ed. 2, p. 219; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 4, p. 640. *Ligustrum obovatum* (sp.), Decaisne, Monogr. Gen. Ligust. & Syringa in Nouv. Arch. du Mus. sér. 2, v. 2 (1879) p. 22. *Phillyrea microphylla*, Grah. Cat. p. 108.—Flowers: Aug.–Nov.

The stamens in the specimens from the Deccan hills, which I have examined, are exserted beyond the corolla-lobes, while in Wight's specimens of *L. neilgherrense*, with which his figure (Icon. t. 1243) agrees, the stamens are not exserted beyond the lobes, but only beyond the tube of the corolla. The stigma, too, of Wight's specimens (correctly shewn in his figure) is more acute than the stigma of the examples from the W. Ghâts.

Higher Ghâts of the Presidency. KONKAN: Amboli Ghât, *Kanitkar*! DECCAN: Mahableshwar, plentiful, *Cooke*!, *Graham*, *H. M. Birdwood*; Harishchandragad, *Gibson* ex *Graham*. S. M. COUNTRY: Párva Ghât, *Dalzell & Gibson*. KANARA: common in moist forests near the Tinai Ghât, *Talbot*.—DISTRIB. India (W. Peninsula).

Osmanthus fragrans, Lour. Fl. Cochinch. v. 1 (1790) p. 29. A shrub with entire or serrate coriaceous glaucous leaves sometimes reaching 7 by 2 in., but usually in cultivated plants much smaller. The flowers are small, white, delightfully fragrant, and the shrub is largely grown in gardens in the Bombay Presidency, where it flowers abundantly during the cold season. It is a native of China and Japan and also of the temperate Himalaya. The flowers are said by Fortune to be used in China to flavor tea. Fl. B. I. v. 3, p. 606; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Gard. in Ind. ed. 5, p. 373; Watt, Dict. Econ. Prod. v. 5, p. 654. *Olea fragrans*, Thunb. Fl. Jap. p. 18, t. 2; Grah. Cat. p. 109; Dalz. & Gibs. Suppl. p. 50.

ORDER LXXXI. SALVADORACEÆ.

Shrubs or trees, usually glabrous, unarmed or spinous. Leaves opposite, entire; stipules minute or 0. Flowers small, hermaphrodite or dioecious, in panicled spikes or racemes. Calyx free, campanulate or ovoid, 3–4-toothed or 4-fid. Corolla gamopetalous, or petals free, 4-merous, shortly campanulate, imbricate in bud. Stamens 4, inserted on the corolla-tube or near the base of the petals, alternate with the lobes or petals; filaments free or connate at the base; anthers ovate. Disk 0 or of 4 glands alternate with the filaments. Ovary superior, 1–2-celled; ovules 1–2 in each cell, erect from its base, anatropous; style short; stigma 2-fid or subentire. Berry or drupe usually 1-seeded. Seed erect, globose or compressed; testa thin or cartilaginous; albumen 0; cotyledons fleshy, plano-convex.—DISTRIB. Tropical and subtropical Asia, Africa, Madagascar, and Malaya; genera 3; species 8–9.

Unarmed; corolla gamopetalous; ovary 1-celled	1. SALVADORA.
Armed; petals free; ovary 2-celled	2. AZIMA.

1. SALVADORA, Linn.

Shrubs or trees. Leaves opposite, entire, usually pale. Flowers small, sessile or pedicellate, along the branches of axillary or terminal panicles. Calyx campanulate, 4-fid. Corolla campanulate; tube short; lobes 4, obtuse, imbricate in bud. Stamens 4, inserted at the base or in the middle of the corolla-tube; filaments slightly flattened. Disk of 4 scales or glands between the bases of the filaments or 0. Ovary 1-celled; ovule solitary; style very short or almost 0; stigma broad, truncate or subpeltate. Drupe globose, supported by the persistent calyx and corolla; endocarp crustaceous. Seed erect, globose.—DISTRIB. East Africa, Arabia, and India; species 2.

Leaves $\frac{3}{4}$ in. and more broad; flowers pedicelled ..... 1. *S. persica.*
Leaves less than $\frac{3}{4}$ in. broad; flowers sessile ..... 2. *S. oleoides.*

1. **Salvadora persica,** *Linn. Sp. Pl.* (1753) p. 122. A large much-branched evergreen shrub or small tree with soft whitish-yellow wood; bark of old stems rugose; branches numerous, drooping, glabrous, terete, finely striate, shining, almost white. Leaves somewhat fleshy, glaucous, $1\frac{1}{2}$–$2\frac{1}{2}$ by $\frac{3}{4}$–$1\frac{1}{4}$ in., elliptic-lanceolate or ovate, obtuse and often mucronate at the apex; base usually acute, less commonly rounded; main nerves 5–6 pairs; petioles $\frac{1}{2}$–$\frac{7}{8}$ in. long, glabrous. Flowers greenish-yellow, in axillary and terminal compound lax panicles 2–5 in. long, numerous in the upper axils; pedicels $\frac{1}{16}$–$\frac{1}{8}$ in. long; bracts beneath the pedicels ovate, very caducous. Calyx $\frac{1}{20}$ in. long, glabrous, cleft $\frac{1}{2}$-way down; lobes rounded. Corolla very thin, $\frac{1}{8}$ in. long, deeply cleft, persistent; lobes $\frac{1}{10}$ in. long, oblong, obtuse, much reflexed. Stamens shorter than the corolla, but exserted, owing to the corolla-lobes being reflexed. Drupe $\frac{1}{8}$ in. in diam., globose, smooth, red when ripe. Fl. B. I. v. 3, p. 619; Grah. Cat. p. 250; Dalz. & Gibs. p. 312; Trim. Fl. Ceyl. v. 3, p. 120; Talb. Trees, Bomb. ed. 2, p. 220; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 6, part 2, p. 448. *Salvadora Wightiana,* Planch. in Thw. Enum. p. 190; Bedd. Flor. Sylvat. t. 247.—Flowers: Nov.–Feb. VERN. *Pilu*; *Pilvá*; *Khákan.*

KONKAN: near the sea in both Konkans, *Graham*; along tidal creeks in Thana district, *Ryan*; Habshi's country, *Dalzell & Gibson.* DECCAN: Bijapur, *Woodrow.* S. M. COUNTRY: Dharwar and Belgaum districts, *Talbot.* KANARA: *Talbot.* GUJARAT: Balsár, *Bhiva!*; Ankleshvar, *Kanitkar!*; Gogo, *Woodrow.* SIND: *Ritchie,* 1308!, *Stocks!*, *Cooke!*, *Dalzell,* 325!—DISTRIB. Drier parts of India, often planted near Mahomedan tombs; Ceylon, dry regions of W. Asia, Egypt, Abyssinia.

The tree is supposed to be the *Mustard Tree* of Scripture. The small drupes and the leaves have the peculiar pungent flavor of many of the *Cruciferæ.* The latter are a favorite fodder of camels and are eaten as a salad. The root-bark is very acrid and used as a vesicant. The fruit is used in medicine. See Watt, Dict. Econ. Prod. l. c.

2. **Salvadora oleoides,** *Decaisne, in Jacquem. Voy. Bot.* (1844) p. 140, t. 144. A shrub or occasionally a small tree with a short twisted or bent trunk; branches numerous, stiff, divergent, whitish. Leaves $1\frac{1}{2}$–3 by $\frac{1}{8}$–$\frac{1}{2}$ in., whitish-green, coriaceous and somewhat fleshy when mature, linear-lanceolate or elliptic-lanceolate, acute or subobtuse, often mucronate, glabrous; main nerves indistinct; petioles $\frac{1}{6}$–$\frac{1}{4}$ in. long. Flowers greenish-white, sessile, in erect axillary panicled spikes 1–$1\frac{1}{2}$ in. long, often clustered. Calyx $\frac{1}{16}$–$\frac{1}{12}$ in. long, cleft about $\frac{1}{2}$-way down; lobes 4, rounded, obtuse. Corolla a little longer than the

calyx, deeply cleft; lobes obovate-oblong, obtuse. Drupes $\frac{1}{3}$–$\frac{1}{2}$ in. in diam., subsessile, globose, yellow when ripe (*Brandis*). Fl. B. I. v. 3, p. 620; Aitch. Pb. & Sind Pl. p. 91; Talb. Trees, Bomb. ed. 2, p. 220; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 164; Watt, Dict. Econ. Prod. v. 6, part 2, p. 447. *Salvadora Stocksii*, Wight, Ill. v. 2, p. 229, and Icon. t. 1621.—Flowers: Jan.–Mar. VERN. *Khabbar*; *Didr*.

In the Bombay Presidency apparently confined to Gujarat and Sind. GUJARAT: Nadiad, *Woodrow*; Junaghad, *Cooke*! SIND: *Dalzell*!, *Woodrow*!, *Stocks*, 633!; Khairpur, common, *Brandis*.—DISTRIB. India (Punjáb, Rajputana); Aden.

The fruit is sweet and is largely eaten by the natives, forming when dried an article of trade and tasting somewhat like currants (*Brandis*). The leaves are the favorite diet of camels during the first quarter of the hot weather, but other animals will not eat them. See Watt, Dict. Econ. Prod. l. c.

2. **AZIMA,** Lamk.

Glabrous, much-branched or sarmentose shrubs armed with axillary spines. Leaves opposite, entire. Flowers dicœcious, small, crowded in the axils or sessile along the branches of a small slightly branched panicle. Calyx campanulate, 4-fid, or, in the female flowers, irregularly 2–4-partite. Petals 4, free, narrow, imbricate in bud. Stamens 4, alternate with the petals; filaments slender; anthers ovate. Scales or glands 0. Ovary 2-celled; ovules 1 or 2 in each cell, erect from the base; stigma subsessile, large. Berry globose. Seeds 1–2, globose; albumen 0.—DISTRIB. Tropical Asia, tropical and south Africa and Madagascar; species 3 or 4.

1. **Azima tetracantha,** *Lamk. Encyc. Méthod.* v. 1 (1783) p. 343. A low spinous rigid bush, woody below only; branches numerous, green, herbaceous, bluntly quadrangular, the younger pubescent. Leaves 1–1$\frac{3}{4}$ by $\frac{1}{2}$–$\frac{3}{4}$ in., elliptic, acute, sharply mucronate, rigid, pale, glabrous, shining, base acute; petioles $\frac{1}{8}$ in. long. Spines often 1$\frac{1}{4}$ in. long, obtusely quadrangular, grooved, very sharp, with an indurated point, slightly pubescent when young, at length glabrous, usually 4, sometimes reduced to 1 and occasionally as many as 7 at a node. Flowers small, greenish-white or yellowish, sessile, in axillary fascicles, the supporting leaves of the upper fascicles reduced to bracts or becoming obsolete, so that the flowering branches end in naked interrupted spikes; bracts foliaceous, pubescent, ovate, acute, spinous-pointed. MALE FLOWERS numerous, crowded in axillary fascicles. Calyx pubescent, $\frac{1}{10}$–$\frac{1}{8}$ in. long; lobes 4, ovate, acute, $\frac{1}{20}$ in. long. Petals a little exserted beyond the calyx-lobes, linear-lanceolate, acute, ciliolate. FEMALE FLOWERS solitary or in pairs. Calyx pubescent, $\frac{1}{6}$ in. long; lobes usually 2, broadly ovate, apiculate, $\frac{1}{8}$ in. long. Petals as in the male. Ovary 2-celled, glabrous; ovules solitary (rarely 2) in each cell; stigma nearly sessile, $\frac{1}{10}$ in. in diam., 2-lobed. Berry $\frac{1}{4}$ in. in diam., globose, glabrous, white, edible, usually 1-seeded. Fl. B. I. v. 3, p. 620; *Dalz. & Gibs.* p. 143; Wight, Ill. v. 2, t. 152; Trim. Fl. Ceyl. v. 3, p. 121; Talb. Trees, Bomb. ed. 2, p. 221; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 1, p. 361. *Monetia tetracantha*, Salisb. Prod. (1796) p. 65; Grah. Cat. p. 117.—Flowers: Dec.–Mar. VERN. *Sakapat*.

KONKAN: Habshi's territory, *Dalzell & Gibson*. DECCAN: Gokák, *Woodrow*. S. M. COUNTRY: Badami, *Kanitkar*!, *Woodrow*; Dharwar, *Ritchie*, 1868!, *Graham*, *Dalzell*

& Gibson, Cooke !—DISTRIB. India (W. Peninsula); Ceylon, Tropical and South Africa and Madagascar.

Dobera Roxburghii, Planch. in Ann. Sc. Nat. sér. 3, v. 10, p. 191. There is a small scrap of a flowering branch of this in Herb. Kew., on which is a ticket "*Bombay, Capt. Geburne*," and this seems to be the only specimen obtained from India. Capt. Geburne was an ardent horticulturist in Bombay itself, and used to introduce plants from various places into his garden. No other botanist has found the plant in Bombay, and the inference of its existence there from the solitary specimen referred to seems hardly justifiable. The ticket on the specimen in question is not in Capt. Geburne's but apparently in Planchon's handwriting.

ORDER LXXXII. APOCYNACEÆ.

Trees or erect or twining shrubs, rarely herbs. Leaves simple, opposite or whorled (rarely alternate), quite entire; stipules 0 or sometimes intrapetiolar glands. Flowers hermaphrodite, regular, in terminal or axillary cymes. Calyx inferior, often glandular inside at the base or at the base of the lobes; lobes 5 (rarely 4), imbricate. Corolla gamopetalous, usually rotate or hypocrateriform; lobes 5 (rarely 4), spreading, contorted, and often twisted in bud (very rarely valvate). Stamens 5 (rarely 4), inserted on the corolla-tube, rarely on its mouth; filaments usually short; anthers linear-oblong or sagittate, free or sometimes adhering to the stigma by the connective, cells 2, dehiscing longitudinally, sometimes produced downwards into an empty spur; pollen granular. Disk sometimes concealing the ovary, annular, cup-shaped or lobed, or of fleshy scales or glands or 0. Ovary 1-celled with 2 parietal placentas, or 2-celled with axile placentas, or of 2 distinct or partially connate carpels; ovules in each cell 2 or few or many and 2–∞-seriate, rarely solitary; style 1, simple or divided at the base; stigma various, usually terminated by an entire or more commonly 2-fid apiculus. Fruit a dry or fleshy drupe, berry or samara, or of 2 drupes, berries or follicles. Seeds various, sometimes winged, sometimes with one or both extremities crowned with a pencil of hairs (*coma*); albumen hard, fleshy or scanty or 0; embryo straight; cotyledons flat, concave, convoluted or contorted; radicle usually superior.—DISTRIB. Chiefly tropical; genera about 110; species more than 900.

Anthers included, free from the stigma, rounded at the base.
- Seeds not comose nor arillate.
  - Ovary of 2 wholly combined carpels.
    - Armed shrubs ..... 1. CARISSA.
  - Ovary of distinct carpels united by the style.
    - Calyx without glands inside.
      - Fruit drupaceous.
        - Leaves whorled ..... 2. RAUWOLFIA.
        - Leaves alternate, scattered (a maritime genus) ..... 3. CERBERA.
      - Fruit follicular ..... 4. LOCHNERA.
    - Calyx glandular inside; fruit follicular.
      - Leaves alternate; erect shrubs ..... 5. RHAZYA.
      - Leaves opposite or whorled; climbing shrubs. 6. ELLERTONIA.
- Seeds comose or arillate.
  - Seeds comose, not arillate.
    - Seeds with a fringe of hairs at each end ..... 7. ALSTONIA.
    - Seeds with a deciduous tuft of hairs at the apex. 8. HOLARRHENA.
  - Seeds arillate, not comose.
    - Seeds with a red or orange aril ..... 9. ERVATAMIA.

Anthers included or exserted, conniving in a cone round and adhering to the stigma, each cell produced into an empty spur. Fruit follicular; seed comose.
- Anthers exserted.
  - Climbing shrubs.
    - Filaments of stamens long, spirally twisted ..... 10. PARSONSIA.
    - Filaments of stamens short, not spirally twisted. 11. VALLARIS.
  - Erect trees or shrubs.
    - Corolla with a corona of scales ..... 12. WRIGHTIA.
- Anthers included.
  - Lofty climbers.
    - Corolla very large, 3 in. or more across.
      - Corolla campanulate or infundibuliform ... 13. BEAUMONTIA.
      - Corolla hypocrateriform ..... 14. CHONEMORPHA.
    - Corolla medium-sized or small, less than 2 in. across.
      - Calyx divided to the base..... ..... 15. AGANOSMA.
      - Calyx not divided to the base.
        - Follicles stout, tapering ..... 16. ANODENDRON.
        - Follicles slender, cylindric ..... 17. ICHNOCARPUS.

1. **CARISSA,** Linn.

Much-branched spinous shrubs, erect, prostrate or climbing. Leaves opposite, small, coriaceous. Flowers in terminal and axillary pedunculate 2-3-chotomous cymes. Calyx 5-partite, rarely glandular within; segments acute. Corolla hypocrateriform; tube cylindric, usually dilated at the top; lobes 5, overlapping to the right in the Indian species. Stamens at the top of the tube, included; anthers obtuse, or apiculate from the produced connective. Disk 0. Ovary 2-celled; ovules 1–4 in each cell, rarely more; style filiform; stigma fusiform or columnar, minutely 2-fid. Berry ellipsoid or globose, 2- or (by suppression) 1-celled. Seeds usually 2, peltately attached to the septum; albumen fleshy; cotyledons ovate; radicle inferior.—DISTRIB. Africa, Tropical Asia, and Tropical Australia; species about 20.

Spines straight.
- Fruit ½ in. and more ..... 1. *C. Carandas.*
- Fruit less than ½ in. ..... 2. *C. spinarum.*

Spines decurved.
- An erect shrub ..... 3. *C. inermis.*
- An extensive climbing shrub ..... 4. *C. suavissima.*

1. **Carissa Carandas,** *Linn. Mantiss.* v. 1 (1767) p. 52. A large evergreen shrub with a short stem, glabrous except the inflorescence; bark light-grey, scaly; branchlets usually alternate, with twin stout sharp horizontal glabrous spines 1–1½ in. long at their base; branches usually without spines. Leaves 1½–3 by 1–2 in., coriaceous, elliptic or obovate, obtuse, often shortly mucronate, glabrous and shining, base subacute; petioles ⅛–¼ in. long. Flowers white, scarcely odorous, in pubescent terminal corymbose cymes; peduncles usually ¼–¾ in. long, sometimes almost 0; pedicels very short; bracts linear, pubescent. Calyx pubescent, cleft rather more than ½-way down; lobes $\frac{1}{10}$–⅛ in. long, lanceolate, very acute, ciliate. Corolla-tube about ½ in. long, swollen and pubescent near the top; lobes ⅜ in. long, oblong-lanceolate, acute, often pubescent and ciliolate. Stamens included within the corolla-tube; filaments very short; anthers linear-oblong. Ovary glabrous; ovules 4 in each cell; stigma slightly penicillate at the apex. Fruit ½-1 in. long, ellipsoid, purplish-black when ripe, smooth, 4- or more-

seeded. Fl. B. I. v. 3, p. 630; Grah. Cat. p. 116; Dalz. & Gibs. p. 143; Bedd. For. Man. in Flor. Sylvat. p. clvi, t. 19, fig. 6; Wight, Icon. t. 426; Trim. Fl. Ceyl. v. 3, p. 124; Talb. Trees, Bomb. ed. 2, p. 222; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 2, p. 165.—Flowers: Jan.–Apr. VERN. *Karvand*; *Karanda.*

KONKAN: *Graham, Talbot, Stocks*!, *Ritchie*, 450! DECCAN: Lanoli, *Gammie*; Khandala, *Cooke*!, *Woodrow*!, *Kanitkar*!; Kadakvasla, *Cooke*! KANARA: N. Kanara, common, *Talbot.*—DISTRIB. Throughout India; Ceylon, Java, Timor.

The fruit is eaten and also made into tarts. It is sold largely in the native markets.

2. **Carissa spinarum,** *Linn. Mantiss.* v. 2 (1771) App. p. 559. A suberect or sometimes prostrate evergreen shrub; young parts and inflorescence pubescent; bark light-colored; branches rigid, often zigzag, terete, divaricate; spines ½–1¼ in. long, horizontal, very sharp, often bifurcate. Leaves 1–1¾ by ½–¾ in., coriaceous, elliptic, acute or obtuse, shortly mucronate, glabrous or pubescent, base acute; petioles ⅛–¼ in. long. Flowers white, sometimes tinged with pink, scented, in few-flowered pubescent corymbose usually terminal cymes, very often in threes on the top of short pubescent peduncles; pedicels short; bracts linear, pubescent. Calyx divided almost to the base; lobes ⅛ in. long, lanceolate, very acute, ciliate. Corolla-tube ¼–⅜ in. long; lobes slightly shorter than the tube, lanceolate, acute, spreading. Ovary 2-celled; ovules 2 in each cell. Berry ¼ in. in diam., subglobose, usually 4-seeded, dark purple. Fl. B. I. v. 3, p. 631; Grah. Cat. p. 116; Trim. Fl. Ceyl. v. 3, p. 125; Talb. Trees, Bomb. ed. 2, p. 222; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 2, p. 166. *Carissa diffusa*, Roxb. Fl. Ind. v. 1, p. 689; Bedd. For. Man. in Fl. Sylvat. p. clvii; Wight, Icon. t. 427. *C. hirsuta*, Roth, Nov. Pl. Sp. (1821) p. 128; Dalz. & Gibs. p. 143. *C. villosa*, Roxb. Fl. Ind. ed. Carey & Wall. v. 2, p. 525; Grah. Cat. p. 116.—Flowers: Jan.–Apr.

Common in the southern districts of the Presidency. S. M. COUNTRY: Badami, *Woodrow*!, *Cooke*!; hills east of Belgaum, *Graham, Dalzell & Gibson*; on dry stony ground in the Dharwar and Belgaum districts, *Talbot.*—DISTRIB. Throughout India; Ceylon.

The fruit is eaten and also made into tarts.—It is said by Talbot to be sweeter than the fruit of *C. Carandas.*

3. **Carissa inermis,** *Vahl, Symb.* v. 3 (1794) p. 43. A large shrub or small tree quite glabrous except the puberulous inflorescence. Spines stout, dark-brown, decurved, simple, 1–1½ in. long. Flowering branches spineless. Leaves coriaceous, drying dark-brown, 2–4 by 1–1¾ in., elliptic or elliptic-lanceolate, acute or acuminate, glabrous, base acute; petioles ⅛–⅙ in. long. Flowers white, in terminal corymbose puberulous cymes; peduncles ⅙–½ in. long; pedicels short; bracts subulate. Calyx pubescent; segments ⅛ in. long, lanceolate, very acute, ciliate. Corolla 1–1¼ in. long; lobes ½ in. long, linear-lanceolate, very acute. Berry ellipsoid, about 1 in. long, in appearance like a plum, purple when ripe. *Carissa macrophylla*, Wall. Cat. (1828) 1679; Fl. B. I. v. 3, p. 631; Talb. Trees, Bomb. ed. 2, p. 223; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prodr. v. 2, p. 166. *Carissa lanceolata*, Dalz. in Dalz. & Gibs. Bo. Fl. p. 143 (*not* of R. Br.). *C. Dalzellii*, Bedd. For. Man. in Flor. Sylvat. p. clvii.—Flowers: Jan.–Feb.

Southern districts of the Presidency. S. M. COUNTRY: Rámghát, *Dalzell & Gibson*,

Ritchie, 443! KANARA: evergreen forests along the N. Kanara Ghâts, abundant near the coast on the hills about Karwar, *Talbot*; hills near Karwar, *Woodrow*; Kâla naddi, *Ritchie*, 443!—DISTRIB. India (W. Peninsula).

Though the specific name given by Vahl is by no means applicable, it does not seem possible to adopt Wallich's name. As K. Schumann remarks (Engl. & Prantl, Pflanzenf. v. 4, part 2, p. 127), the specific name is unfortunate, but has the sanction of priority.

4. **Carissa suavissima,** *Bedd. ex Hook. f. Fl. B. I.* v. 3 (1882) p. 632. A lofty climber quite glabrous. Spines decurved, stout, $\frac{1}{4}$–$\frac{3}{8}$ in. long (in the specimens in Herb. Kew.). Leaves $1\frac{3}{4}$–3 by $1\frac{1}{2}$–2 in., broadly ovate, acuminate, glabrous, base usually rounded; petioles $\frac{1}{8}$–$\frac{1}{6}$ in. long. Flowers white, in terminal corymbose glabrous cymes. Calyx glabrous; segments $\frac{1}{6}$ in. long, lanceolate, very acute. Corolla 1–$1\frac{1}{4}$ in. long; lobes $\frac{3}{8}$ in. long, linear-lanceolate, acute. Berry with much milky juice, 1–2 in. long, ellipsoid, edible, black when ripe. Talb. Trees, Bomb. ed. 2, p. 223; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165. —Flowers: Jan.–Feb.

The fruit is said by Beddome to be very delicious, and is described as being nearly 2 in. long by $1\frac{1}{4}$ in. broad.

Talbot considers the plant to be conspecific with *C. inermis* and to differ only in the glabrous cymes and climbing habit. In the specimens in Herb. Kew. communicated by Colonel Beddome from the Madura district, the leaves are broader than in *C. inermis* and the spines much shorter.

DECCAN: Lanoli Grove, *Gammie*. KANARA: evergreen forests of the N. Kanara Ghâts, *Talbot*.—DISTRIB. India (W. Peninsula).

Carissa arduina, Lam. Encyc. Méthod. v. 1 (1783) p. 555. A dwarf glabrous shrub with twice-forked spines, subsessile cymes, pale-pink sepals, a white corolla and a scarlet berry, a native of S. Africa, is sometimes grown in gardens. Grah. Cat. p. 117; Dalz. & Gibs. Suppl. p. 53. *Arduina bispinosa*, Linn. Mantiss. v. 1 (1767) p. 52; Woodr. Gard. in Ind. ed. 5, p. 378.

2. RAUWOLFIA, Linn.

Glabrous shrubs. Leaves 3–4-verticillate (rarely opposite). Flowers in few-flowered often umbelliform cymes; peduncles alternating with the terminal leaves, at length becoming lateral. Calyx short, 5-fid or 5-partite, eglandular inside. Corolla hypocrateriform; tube cylindric, inflated over the anthers, usually hairy within; lobes 5, overlapping to the left. Stamens inserted at the middle of the tube or higher up, included; antlers small, subacute, the cells rounded at the base. Disk cup-shaped or annular, entire or shortly lobed. Carpels 2, distinct or connate; ovules 2 in each carpel, collateral; style filiform; stigma thick, broad and often toothed at the apex, annular or appendiculate at the base, tip shortly 2-fid. Fruit of 2 connate or distinct usually 1-seeded drupes. Seeds ovoid; albumen fleshy; cotyledons flat.—DISTRIB. Tropics of both hemispheres, S. Africa; species about 50.

A small shrub; corolla-tube slender, inflated a little above the middle ..... 1. *R. serpentina.*
A large shrub; corolla-tube wide, inflated below the mouth ..... 2. *R. densiflora.*

1. **Rauwolfia serpentina,** *Benth. ex Kurz, For. Fl. Br. Burm.* v. 2 (1877) p. 171. A small erect shrub (climbing in a rich soil according to Roxburgh, Fl. Ind. v. 1, p. 694), rarely reaching, in the Bombay Presidency, 3 ft. high; bark pale, rarely lenticellate. Leaves in whorls of 3, thin, 3–7 by 1–2½ in., lanceolate, acute or acuminate, glabrous, bright green above, pale beneath, base tapering; main nerves 8–10 pairs, slender; petioles ⅓ in. long, somewhat obscure owing to the blade running down into the petiole. Flowers white, often tinged with violet, in many-flowered irregular corymbose cymes; peduncles 2–5 in. long; pedicels stout, ⅛–¼ in. long, bright red; bracts beneath the pedicels triangular, acute, $\frac{1}{25}$–$\frac{1}{16}$ in. long. Calyx glabrous, bright-red; segments $\frac{1}{10}$ in. long, lanceolate. Corolla ⅜–½ in. long or rarely a little longer; tube slender, swollen a little above the middle; lobes ⅛ in. long, elliptic-oblong, rounded at the apex. Disk cup-shaped, membranous, obscurely lobed. Drupes single, or didymous and connate more or less deeply, about ¼ in. in diam., purplish-black when ripe. The inflorescence of this plant with red pedicels and calyx and white corolla is striking. Sir W. Jones (As. Res. v. 4, p. 308) says that "few shrubs are more elegant, especially when the vivid carmine of the perianth is contrasted not only with the milk-white corolla, but with the rich green berries which at the same time embellish the fascicle; the mature berries are black and their pulp light-purple." Fl. B. I. v. 3, p. 632; Trim. Fl. Ceyl. v. 3, p. 126; Talb. Trees, Bomb. ed. 2, p. 223; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, *Dict. Econ. Prod.* v. 6, part 1, p. 398. *Ophioxylon serpentinum,* Linn. Sp. Pl. (1753) p. 1043; Grah. Cat. p. 116; Dalz. & Gibs. p. 143; Roxb. Fl. Ind. v. 1, p. 694; Wight, Icon. t. 849; Bedd. For. Man. in Flor. Sylvat. p. clvi.—Flowers: Mar.–May. VERN. *Hadki.*

KONKAN: *Stocks!*, common, *Dalzell & Gibson*; North and South Konkan, *Law!*; jungles near Goa, *Dr. Lush* ex *Graham.* S. M. COUNTRY: Castlerock, *Woodrow, Kanitkar!* KANARA: moist forests of N. Kanara, *Talbot.*—DISTRIB. India (Sub-himalayan tract from Sirhind eastwards, Birma, Andamans, W. Peninsula); Ceylon, Java.

2. **Rauwolfia densiflora,** *Benth. ex Hook. f. Fl. B. I.* v. 3 (1882) p. 633. A shrub reaching 12 ft. high with milky juice; branches copiously lenticellate. Leaves 3–4 in a whorl near the ends of the branches, very variable in size, 3–9 by 1–3 in., oblanceolate or obovate, acuminate, glabrous, light-green above, paler beneath, base tapering; main nerves 8–20 pairs, more or less conspicuous; petioles ½ in. long, somewhat obscure. Flowers white or pink, appearing with the young leaves, in lax few-flowered corymbose cymes; peduncles several together, ¾–2½ in. long, erect or decurved; pedicels slender, ¼–⅜ in. long; bracts minute. Calyx ⅛ in. long, glabrous; segments $\frac{1}{10}$–⅛ in. long, lanceolate, acute. Corolla ⅜ in. long; tube stout, slightly longer than the lobes, inflated at the top, throat hairy within; lobes elliptic-oblong, rounded at the apex. Drupes single or in pairs, free, ellipsoid, ⅓–½ in. long, brownish-purple when ripe. Trim. Fl. Ceyl. v. 3, p. 126; Talb. Trees, Bomb. ed. 2, p. 223; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165. *Rauwolfia decurva,* Hook. f. Fl. B. I. v. 3, p. 633. *Ophioxylon neilgherrense,* Wight, Icon. t. 1292; Dalz. & Gibs. p. 144.—Flowers: Mar.–Apr.

I have included *Rauwolfia decurva,* Hook. f., with this. The decurved

peduncles are not a constant character. I have found erect and decurved peduncles on the same plant.

KONKAN: *Law*!; Poladpur, *Woodrow*! DECCAN: Lanoli, *Gammie*, *Kanitkar*!; Mahableshwar, *Cooke*! S. M. COUNTRY: Rámghát, *Ritchie*, 1850! KANARA: common in the forests of the Supa division of N. Kanara, *Talbot*; Ainshi Ghát, *Talbot*, 1190! —DISTRIB. India (Khasia mountains, Western Peninsula); Ceylon.

Rauwolfia canescens, Linn. Sp. Pl. ed. 2 (1762) p. 303. A small shrub with whorled ovate-oblong leaves, small white flowers and dark-red drupes, a native of the West Indies, has been occasionally grown in gardens. Dalz. & Gibs. Suppl. p. 53.

3. CERBERA, Linn.

Small glabrous trees or large shrubs. Leaves alternate or scattered, long; nerves slender, horizontal and parallel. Flowers large, white or red, in terminal cymes. Calyx 5-partite, without glands inside; segments long. Corolla subinfundibuliform; tube short, the throat slightly dilated, ribbed or with pubescent scales inside; lobes 5, broad, spreading, longer than the tube, overlapping to the left. Stamens included; anthers lanceolate, apiculate, the cells rounded at the base. Disk 0. Carpels of the ovary 2, distinct; ovules 4 in each carpel, on both sides of a thick placenta; style filiform; stigma large, ovoid, with 2 truncate points. Fruit usually of 1 (rarely 2) globose ovoid or ellipsoid 1–2-seeded carpels; pericarp very thick, fibrous and woody. Seeds broad, compressed, peltately attached to the enlarged placenta; albumen 0; cotyledons thinly fleshy; radicle very short.—DISTRIB. Madagascar, Tropical Asia, and the Pacific Islands; species 4.

1. **Cerbera Odollam,** *Gærtn. Fruct.* v. 2 (1791) p. 193. A small tree or large shrub with an acrid milky poisonous juice, glabrous; branchlets whorled, stout, marked with leaf-scars. Leaves alternate, closely set at the ends of the branches, 5–10 by 1½–2½ in., coriaceous, black when dry, lanceolate, oblanceolate or oblong-obovate, suddenly acuminate, glabrous, much tapering to the base; main nerves numerous, slender, horizontal, connected by an intramarginal nerve; petioles ¾–1½ in. long. Flowers large, white with a yellow throat, odorous, in terminal peduncled paniculate cymes; peduncles 2–6 in. long; pedicels stout; bracts colored, ½–1 in. long, oblong, acute, caducous. Calyx glabrous; segments ¾–1 in. long, linear-oblong, very acute, recurved. Corolla-tube ½–¾ in. long, the upper part dilated, the throat nearly closed by 5 pubescent projecting wing-like ribs; lobes longer than the tube, broadly elliptic, acute, oblique. Ovary of 2 distinct carpels united by a single style. Fruit (from the suppression of 1 carpel) a drupe 2–4 in. long, subglobose, smooth, green. Seed usually solitary. Fl. B. I. v. 3, p. 638; Grah. Cat. p. 116; Dalz. & Gibs. Suppl. p. 53; Wight, Icon. t. 441; Bedd. For. Man. in Flor. Sylvat. p. clvii; Trim. Fl. Ceyl. v. 3, p. 128; Talb. Trees, Bomb. ed. 2, p. 224; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 2, p. 256.—Flowers: June–Jan. VERN. *Sukanu.*

Not very common in the Bombay Presidency though abundant to the south on the Malabar coast. KONKAN: salt-swamps in S. Konkan, *Graham*; Anant (S. Konkan),

Woodrow. KANARA: salt-swamps of N. Kanara, planted in hedges near the sea-coast at Mardeshvar, *Talbot*.—DISTRIB. Throughout India in salt-swamps or on the sea-coast; Ceylon, Malay Archipelago, China, Australia, Islands of the Pacific.

4. LOCHNERA, Reichb.

Annual or perennial herbs or undershrubs. Leaves opposite; axillary glands numerous, in a fringe, the outer long, filiform, the inner minute. Flowers axillary, solitary or in pairs, white or pink. Calyx herbaceous, 5-partite, without glands inside; segments subulate, scarcely imbricate. Corolla hypocrateriform; tube slender, cylindric, slightly inflated over the stamens below the constricted mouth; lobes overlapping to the left. Stamens on the corolla-tube; filaments very short; anthers free from the stigma, ovate-lanceolate, acute, shortly and obtusely 2-lobed at the base. Disk replaced by 2 long linear glands alternating with the carpels. Carpels 2, free; ovules numerous, 2-seriate; style filiform; stigma depressed-capitate, with a long hyaline reflexed frill at the base and a minute obtuse 2-lobed apiculus surrounded by a very short erect membranous rim. Follicles cylindric, slightly spreading. Seeds numerous, small; testa rugose; hilum lateral; albumen fleshy; cotyledons oblong, flat, shorter than the thick radicle.—DISTRIB. Tropical America, India, Madagascar; species 3.

The genus *Lochnera* has been separated from the genus *Vinca*, under which it is included in Benth. & Hook. Gen. Pl. v. 2, p. 703. In the genus *Lochnera* the filaments are short and slender, the anthers glabrous at the tip, lanceolate, the connective not produced, and the stigma glabrous. In the genus *Vinca* as now adopted, the filaments are clavate, the anthers hairy at the tip, broadly oblong, the connective produced, and the stigma hairy.

1. **Lochnera pusilla,** *K. Schum. in Engl. & Prantl, Pflanzenf.* v. 4, part 2 (1895) p. 145. An erect annual, 6–18 in. high; branches numerous, spreading from the base, quadrangular. Leaves 1½–3 by ⅓–1 in., lanceolate, acute, glabrous, with rough margins, base tapering; petioles ⅛–¼ in. long; axillary glands long, subulate. Flowers white, small, solitary or in pairs, axillary; pedicels short. Calyx ⅛–⅕ in. long, glabrous; segments ⅛–⅙ in. long, lanceolate-subulate. Corolla-tube ⅓ in. long, slightly enlarged near the top, the mouth narrow, hairy, the throat glabrous inside; lobes ⅛ in. long, oblong-obovate, obtuse, apiculate. Follicles 1½–2 in. long, very slender, straight, pointed, membranous, glabrous, striate, diverging. Seeds $\frac{1}{10}$–⅛ in. long, cylindric, rounded at both ends and with many muriculate ribs, black when ripe. *Vinca pusilla*, Murr. in Nov. Comm. Soc. Reg. Sc. Gott. v. 3 (1773) p. 66, tab. 2, pl. 1; Hook. f. Fl. B. I. v. 3, p. 640; Dalz. & Gibs. p. 144; Trim. Fl. Ceyl. v. 3, p. 130; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 6, part 4, p. 243. *Catharanthus pusillus*, G. Don, Gen. Syst. v. 4 (1837) p. 95; Grah. Cat. p. 116.—Flowers: July–Sept. VERN. *Sankaphi*; *Sangkhi*.

KONKAN: near Vingorla, *Dalzell & Gibson*. DECCAN: common, *Dalzell & Gibson*, *Dr. Lush* ex *Graham*; Poona, *Cooke*!, *Woodrow*! S. M. COUNTRY: Padshapur, *Ritchie*, 1849!; Badami, *Woodrow*! KANARA: *Stocks*!, *Law*! GUJARAT: Udwarra, *Cooke*!—DISTRIB. India (W. Himalaya, Upper Gangetic plain; W. Peninsula); Ceylon.

Lochnera rosea, Reichb. Consp. Reg. Veg. (1823) p. 134. A well known garden shrub, often called (though probably a native of the

West Indies) the *Madagascar Periwinkle*. It has obovate leaves and rosy or white flowers. It is propagated by seed and spreads freely when introduced into a garden. K. Schum. in Engl. & Prantl, Pflanzenf. v. 4, part 2, p. 157, fig. 57, A–D; Stapf, in Dyer, Fl. Trop. Afr. v. 4, p. 118. *Vinca rosea*, Linn. Syst. ed. 10 (1759) p. 944; Hook. f. Fl. B. I. v. 3, p. 640; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Gard. in Ind. ed. 5, p. 377; Watt, Dict. Econ. Prod. v. 6, part 4, p. 244. *Catharanthus roseus*, G. Don, Gen. Syst. v. 4 (1837) p. 95; Grah. Cat. p. 115; Dalz. & Gibs. Suppl. p. 53.—Flowers more or less throughout the year. VERN. *Sadáphuli*.

5. **RHAZYA,** Decaisne.

Erect glabrous shrubs or undershrubs. Leaves alternate, thick; nerves obscure. Flowers at the ends of the branches, densely cymose, corymbose or subthyrsoid. Calyx short, 5-partite, without glands inside; segments acuminate. Corolla hypocrateriform; tube cylindric, slightly dilated above the stamens, with reflexed hairs beneath the stamens within, throat constricted, hairy inside; lobes 5, short, broad, overlapping to the left. Stamens above the middle of the tube, included; anthers lanceolate, the cells rounded at the base. Disk shortly annular or obscure. Carpels of the ovary 2, distinct; ovules many in each carpel, 2-seriate; style filiform; stigma broadly thickened, sometimes appendiculate with a reflexed membrane, with a very short 2-globose apiculus. Follicles 2, erect, narrowly cylindric. Seeds many, subterete or angled and compressed, truncate or winged at both ends; albumen fleshy; cotyledons oblong, thick; radicle superior.—DISTRIB. Western Asia and Arabia; species 2.

1. **Rhazya stricta,** *Decaisne, in Ann. Sc. Nat.* sér. 2, v. 4 (1835) p. 81. A small glabrous leafy shrub reaching 3 ft. high. Leaves yellowish when dried, sessile, numerous, coriaceous, alternate, 3–4½ by ⅜–¾ in., linear-lanceolate or elliptic-lanceolate, acute, glabrous, base tapering; nerves (except the midrib) obscure. Flowers white, slightly odorous, in terminal and axillary corymbose cymes; pedicels short, stout; bracts lanceolate, acute, pubescent, ciliate. Calyx glabrous; segments $\frac{1}{16}$ in. long, lanceolate, acute. Corolla ½–⅝ in. long; tube inflated in the upper half, with hairs in the throat and densely silky hairy below the stamens; lobes $\frac{1}{12}$ in. long, linear-oblong, apiculate. Ovary glabrous, of 2 distinct carpels; style slender; stigma shortly apiculate, the apiculus 2-lobed. Follicles erect, 2–3 by ¼ in., parallel, cylindric, pointed, straight or slightly curved near the top, pale-brown, striately nerved, glabrous. Seeds ⅜ in. long, oblong, angular, compressed, shortly winged at the ends and sometimes slightly on the angles; testa strongly rugose, with elevated ridges. Fl. B. I. v. 3, p. 640; Boiss. Fl. Orient. v. 4, p. 46; Aitch. Pb. & Sind Pl. p. 88; Talb. Trees, Bomb. ed. 2, p. 224; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 6, part 1, p. 443.—Flowers: Dec. VERN. *Sevar*; *Sihar*; *Ishvarg*.

In the Bombay Presidency confined to Sind. SIND: hills of Sind, *Dalzell*, 83!, *Stocks*, 570!; Boogta hills, *Vicary*!; Sehwan, *Cooke*!; Sind frontier, *Cooke*!—DISTRIB. India (Panjáb); Beluchistan, Afghanistan, Arabia.

The dried leaves are sold in the bazaars throughout Sind, and their infusion is said to be a good and peculiar bitter tonic. The dried fruit is used throughout Beluchistan for coagulating milk in the manufacture of cheese. See Watt, Dict. Econ. Prod. l. c.

6. **ELLERTONIA,** Wight.

Glabrous climbing shrubs. Leaves opposite, or 3–4-nately whorled, coriaceous. Flowers slender, in subterminal cymes. Calyx small, deeply 5-fid, without glands inside. Corolla hypocrateriform; tube cylindric, dilated over the stamens, the throat constricted, naked; lobes 5, narrow, overlapping to the left. Stamens in the middle of the tube, included; filaments very short; anthers free, lanceolate, the cells obtuse at the base. Disk 0. Carpels 2, distinct; ovules numerous in each carpel, 2–∞-seriate; style filiform; stigma ovoid or oblong, with a linear 2-fid apiculus. Follicles 2, linear or linear-oblong, divaricate, terete, coriaceous. Seeds 2-seriate, oblong, flattened, peltately attached, winged at both ends; albumen scanty; cotyledons flat, foliaceous; radicle superior.—Distrib. Asia and Madagascar; species about 4.

The genus was named by Wight after Dr. J. Ellerton Stocks.

1. **Ellertonia Rheedei,** *Wight, Icon.* (1850) t. 1295. A climbing glabrous shrub; branches twining, slender, terete, often with lenticels. Leaves 3–5 by 1–2 in., bluish-grey beneath when dry, coriaceous, elliptic-oblong, acuminate, glabrous, base rounded or subacute; main nerves 10–12 pairs, slender; petioles $\frac{1}{4}$ in. long. Flowers in 2–3-chotomously branched cymes; peduncles long, few or several together; bracts small, acute, persistent; pedicels short, slender. Calyx glabrous; segments $\frac{1}{30}$ in. long, ovate, acute, with membranous margins. Corolla-tube $\frac{1}{2}$ in. long, very slender, inflated in the middle, without hairs in the throat; lobes shorter than the tube, linear-lanceolate, acute. Stamens in the middle of the tube; filaments hairy; anthers free, lanceolate, apiculate. Carpels of the ovary distinct; style slender; stigma with a deeply 2-fid apiculus. Follicles 2–4 in. long, cylindric, divaricate, slightly recurved, pointed at the apex. Seeds $1\frac{1}{4}$ in. long, with a membranous wing at each end and an elliptic flattened nucleus. Fl. B. I. v. 3, p. 641; Dalz. & Gibs. p. 146; Talb. Trees, Bomb. ed. 2, p. 224.—Flowers: Nov.–Jan.

A rare tree. Konkan: *Law!, Stocks!, Gibson!*; Wari country, *Dalzell & Gibson!*. Kanara: evergreen forests near the Ainshi Ghát at 1000 ft. elevation, *Talbot*. —Distrib. India (W. Peninsula), apparently endemic.

7. **ALSTONIA,** R. Br.

Trees or erect shrubs. Leaves usually whorled. Flowers in subterminal corymbose cymes. Calyx 5-lobed or 5-partite, without glands inside. Corolla hypocrateriform; tube cylindric, the throat naked or more or less closed by a ring of reflexed hairs; lobes overlapping to the right or left. Stamens near the top of the tube, included; anthers free, subacute. Disk annular or sometimes obscure, or sometimes truncate or lobed. Carpels 2, distinct; ovules numerous in each carpel, ∞-seriate; style filiform; stigma minute or shortly 2-fid. Follicles 2, linear, slender. Seeds oblong or linear, flattened, peltately attached, often ciliate; albumen scanty; cotyledons oblong, flat; radicle superior. —Distrib. Tropical Asia, Malaya, Australia, Polynesia; species about 30.

Follicles 12–24 in. long	1. *A. scholaris.*
Follicles 3–5 in. long	2. *A. venenata.*

1. **Alstonia scholaris,** *R. Br. in Mem. Wern. Soc.* v. 1 (1811) p. 76. A tall tree 40–60 ft. (under favourable circumstances reaching 90 ft.) high with bitter milky juice, glabrous except the inflorescence; bark grey, rough; branches whorled; young branchlets copiously lenticellate. Leaves 4–7 (rarely more) in a whorl, coriaceous, 4–8 by 1½–2½ in., oblong-lanceolate or obovate, obtuse or sometimes shortly and bluntly acuminate, dark-green above, pale and covered with a whitish bloom beneath, base tapering; main nerves numerous, nearly horizontal, parallel, uniting in an intramarginal nerve; petioles ¼–½ in. long. Flowers greenish-white, in umbellately branched many-flowered pubescent capitate cymes; peduncles 1–2 in. long; pedicels very short; bracts oblong, pubescent. Calyx $\frac{1}{10}$–$\frac{1}{8}$ in. long, pubescent; lobes $\frac{1}{12}$ in. long, oblong, obtuse, ciliate. Corolla-tube ⅓ in. long, villous inside, the mouth with a ring of hairs; lobes ⅕ in. long, cuneate-oblong, rounded or subtruncate at the apex, pubescent. Disk 0. Carpels pubescent. Follicles 12–24 in. long by ⅛ in. in diam., cylindric, pendulous in clusters, becoming completely everted after dehiscence. Seeds ¼ in. long, linear-oblong, flattened, rounded and with a fringe of hairs at both ends, the hairs longer than the seed. Fl. B. I. v. 3, p. 642; Grah. Cat. p. 115; Dalz. & Gibs. p. 145; Bedd. Flor. Sylvat. t. 242; Trim. Fl. Ceyl. v. 1, p. 133; Talb. Trees, Bomb. ed. 2, p. 225; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 1, p. 197.—Flowers: Dec.–Mar. VERN. *Sátvin.*

KONKAN: vale of the Savitri river between Poladpur and the Ghâts, *Graham*; Garbet ridge, Matheran, *H. M. Birdwood.* DECCAN: near Lanoli, *Woodrow.* KANARA: common in the evergreen forests of N. Kanara, *Talbot.*—DISTRIB. Throughout India, often cultivated; Ceylon, Java, Tropical Africa, Eastern Australia.

The bark, which is known as *Dita bark*, is an article of commerce and employed in medicine. See Watt, Dict. Econ. Prod. l. c.

2. **Alstonia venenata,** *R. Br. in Mem. Wern. Soc.* v. 1 (1811) p. 77. A shrub usually 6–8 ft. high, sometimes a small tree 20 ft. in height (*Talbot*), glabrous. Leaves in whorls of 3–6, membranous, 4–8 by ¾–1¾ in., oblong-lanceolate, very finely acuminate, base much tapered; main nerves numerous, very close, parallel, slender, uniting in an intramarginal nerve, midrib strong; petioles ½–¾ in. long, but obscure owing to the decurrent leaf-blade. Flowers white, inodorous, in terminal subumbellate pedunculate cymes, the flowers often racemose on the branches. Calyx $\frac{1}{10}$ in. long; lobes $\frac{1}{16}$ in. long, triangular-ovate, acute, ciliate. Corolla-tube ½–⅞ in. long, slender, swollen at the top over the stamens, mouth contracted and closed by a ring of hairs, throat hairy at and below the insertion of the stamens; lobes ⅓ in. long, oblong, subacute, glabrous. Disk of 2 ligulate glands alternating with the carpels. Follicles 3–5 by ⅓ in., stalked, falcately curved, tapering at both ends, beaked, glabrous, striate. Seeds ⅜–½ in. long, flattened, linear-oblong, with a tuft of hairs at each end, the hairs shorter than the seed. Fl. B. I. v. 3, p. 642; Dalz. & Gibs. Suppl. p. 52; *Wight*, Icon. t. 436; Bedd. For. Man. in Flor. Sylvat. p. clx; Talb. Trees, Bomb. ed. 2, p. 226.—Flowers: Nov.–Jan.

Not common. KONKAN: *Stocks!, Dalzell!* KANARA: evergreen forests of N. Kanara near the Nilkund and Divimana Ghâts, *Talbot.*—DISTRIB. India (W. Peninsula).

8. **HOLARRHENA,** R. Br.

Trees or shrubs. Leaves opposite, membranous. Flowers white, in terminal or subaxillary many-flowered corymbose cymes. Calyx 5-partite or deeply 5-fid, usually glandular inside; lobes small, narrow. Corolla hypocrateriform; tube slender, cylindric, slightly dilated over the stamens, the throat contracted, naked; lobes 5, oblong, overlapping to the left. Stamens near the base of the tube, included; filaments short; anthers lanceolate, free from the style, shortly mucronate, cells rounded at the base. Disk 0. Carpels 2, distinct; ovules many in each carpel; style short, filiform; stigma slightly thickened, oblong-fusiform, the tip entire or 2-fid. Follicles 2, elongate, diverging, incurved, terete. Seeds oblong or linear, compressed, concave, tipped with a deciduous coma; funicle in the concavity; albumen scanty; cotyledons broad, complicate; radicle short, superior.—DISTRIB. Tropical Asia and Africa; species 7 or 8.

1. **Holarrhena antidysenterica,** *Wall. Cat.* (1828) 1672. A shrub or small tree, glabrous or pubescent; bark pale. Leaves 4–8 by 2–4½ in., from broadly ovate to elliptic, obtuse or obtusely acuminate, glabrous or more or less pubescent, base usually obtuse; main nerves 10–14 pairs, conspicuous; petioles ⅛ in. long, sometimes 0. Flowers white, inodorous, in terminal corymbose cymes 3–6 in. in diam.; pedicels slender; bracts small, lanceolate, pubescent and ciliate. Calyx-lobes $\frac{1}{10}$–⅛ in. long, oblong-lanceolate, acute, ciliate. Corolla puberulous outside; tube ⅓–½ in. long, slightly inflated near the base over the stamens, mouth not closed with a ring of hairs, throat hairy inside; lobes about equalling the tube, oblong, rounded at the apex, more or less pubescent. Follicles 8–15 in. long, ¼–⅓ in. in diam., cylindric, often dotted with white spots. Seeds ⅓ in. long or rather more, linear-oblong, tipped with a spreading deciduous coma of brown hairs ¾–1 in. long. Fl. B. I. v. 3, p. 644; Dalz. & Gibs. p. 145; Bedd. For. Man. in Flor. Sylvat. p. clx, t. 20, fig. 6; Talb. Trees, Bomb. ed. 2, p. 226; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 4, p. 255. *Wrightia antidysenterica*, Grah. Cat. p. 114 (exclud. some syns.).—Flowers: Feb.–June. VERN. *Kudá*; *Pándhrá-kudá*; *Dola-kudá.*

KONKAN: *Law*!, *Stocks*!; near Matheran, *Cooke*!; the Ghâts and hilly parts of the Konkan, *Graham*. DECCAN: Koina Valley below Mahableshwar, *Cooke*!; Deccan hills, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 447! KANARA: Supa Ghâts, *Ritchie*, 447!—DISTRIB. More or less throughout India; Malacca.

The bark and seeds constitute a very important drug in Hindu Materia Medica, the former being considered a valuable remedy in dysentery and known in commerce as *Conessi* bark. Some confusion has arisen owing to the fact that *Wrightia tinctoria*, has been mistaken for *Holarrhena antidysenterica*, which it much resembles and is often sold instead of it. See Watt, Dict. Econ. Prod. l. c.

9. **ERVATAMIA,** Stapf, in Dyer, Fl. Trop. Afr. v. 4, p. 126.

Shrubs or small trees, usually glabrous. Leaves opposite; axillary stipules usually distinct; axillary glands small, often numerous. Flowers in terminal or pseudo-axillary usually paired corymbose or umbelliform cymes. Calyx small; lobes 5, free or connate at the base, glandular inside, imbricate. Corolla hypocrateriform; tube cylindric, slightly

enlarged towards the naked mouth, rarely near or below the middle; lobes overlapping to the left, rarely to the right. Stamens erect, inserted in the inflated part of the corolla, included; filaments short; anthers linear, acute, 2-lobed at the base, polliniferous and dehiscing throughout their entire length. Disk 0. Carpels of the ovary 2, sometimes slightly coherent; ovules numerous in each carpel, many-seriate; style usually long, filiform; stigma at the level of the anthers, clavate or oblong-ellipsoid with a slender papillose bifid apiculus. Follicles twin, more or less coriaceous when mature, obliquely ovoid to lanceolate, usually curved and beaked, rounded on the back, usually 1–3-keeled on each side. Seeds few to many, enveloped in an orange-colored or red aril, more or less irregularly ellipsoid, deeply grooved ventrally; testa crustaceous, finely sulcate; albumen copious.—DISTRIB. Tropical Asia, Australia, and Polynesia, 1 species in Madagascar; species about 30.

Dr. Stapf has broken up the genus *Tabernæmontana*, which had become a heterogeneous assemblage, into several new genera, with the result that the genus *Tabernæmontana* proper has been entirely excluded from the Old World (see Stapf, in Dyer, Fl. Trop. Afr. v. 4, p. 25). Most of the Indian species under the genus *Tabernæmontana* in Hook. f. Fl. B. I. will be transferred to the new genus *Ervatamia*.

1. **Ervatamia Heyneana,** *T. Cooke.* A shrub or small tree 8–15 feet high; bark grey, rough. Leaves 3–8 by 1¼–3 in., coriaceous, oblong or oblong-lanceolate, shortly acuminate, glabrous, base acute; main nerves 12–16 pairs; petioles ⅓–¾ in. long, dilated at the base. Flowers in pedunculate many-flowered cymes; peduncles 1–2 in. long; pedicels ½–1 in. long; buds clavate, rounded at the apex. Calyx ⅕ in. long, coriaceous, glabrous; lobes ⅛ in. long, broadly oblong, obtuse, with membranous margins. Corolla-tube ⅝–1 in. long, inflated near the top; limb (when expanded) 1 in. across, with obtuse crisped lobes overlapping to the right. Follicles 1–1¼ by ⅜–½ in., yellow when ripe, subsessile, curved, somewhat boat-shaped, usually with a short beak which is often recurved, and 2 sharp side-ribs. Seeds ⅓ in. long, surrounded by a red pulp. *Tabernæmontana Heyneana*, Wall. Cat. (1828) 1573; in Bot. Reg. (1829) n. 7, sub t. 1273; Hook. f. Fl. B. I. v. 3, p. 646; Talb. Trees, Bomb. ed. 2, p. 226; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165. *T. crispa*, Dalz. & Gibs. p. 144 (*not* of Roxb.); Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165. *T. dichotoma* (?), Grah. Cat. p. 115 (*not* of Roxb.).—Flowers: Mar.–Apr. VERN. *Nágkudd.*

KONKAN: *Law!*, *Stocks!*; Matheran, *Cooke!* S. M. COUNTRY: Rámghát, *Ritchie*, 1848!; Castlerock, *Bhiva!*, *Woodrow!* KANARA: *Ritchie*, 1848!; N. Kanara in evergreen forests common, *Talbot.*—DISTRIB. India (W. Peninsula), apparently endemic.

Ervatamia coronaria, Stapf, in Dyer, Fl. Trop. Afr. v. 4 (1902) p. 127. A well known glabrous much-branched shrub with pale bark, grown largely (especially that with double flowers) in gardens throughout the Bombay Presidency and indeed throughout India. Its native country is not known with certainty, but it is supposed to be indigenous in N. India. Leaves 3–6 by ¾–1½ in., lanceolate or oblong, acuminate; main nerves 7–9 pairs; petioles ⅛–¼ in. long. Flowers snow-white, fragrant at night, inodorous during the day; corolla-tube ¾–1 in. long, the mouth naked; lobes overlapping to the left. There is a long- and a

short-styled form, the pistil measuring in the first about ½ in. and in the second ¼ in. long. The long-styled form has the anthers in the middle of the corolla-tube, the other at ⅓ its length from the base. *Tabernæmontana coronaria*, Willd. Enum. Hort. Berol. (1809) p. 275; Hook. f. Fl. B. I. v. 3, p. 646; Grah. Cat. p. 115; Dalz. & Gibs. p. 144; Wight, Icon. t. 477; Bedd. For. Man. in Flor. Sylvat. p. clix; Trim. Fl. Ceyl. v. 3, p. 133; Talb. Trees, Bomb. ed. 2, p. 227; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Gard. in Ind. ed. 5, p. 377; Watt, Dict. Econ. Prod. v. 6, part 3, p. 401.—VERN. *Tagar*.

10. **PARSONSIA,** R. Br.

Climbing shrubs. Leaves opposite. Flowers small, white, in terminal or axillary dichotomous cymes or thyrses. Calyx 5-partite, glandular or naked or with 5 scales inside. Corolla hypocrateriform; tube short, cylindric or subglobose, the throat naked; lobes 5, very slightly overlapping to the right. Stamens inserted on the tube; filaments often twisted; anthers ½-exserted, oblong-lanceolate or linear, acute, conniving round the stigma and adhering to it, the cells produced at the base into empty rigid appendages. Disk of 5 lobes or scales. Ovary 2-celled; ovules many in each cell; style filiform, the top dilated, truncate; stigma columnar or elongate-conic. Fruit cylindric, the carpels cohering for a long time, at length separating from the 2 placentas. Seeds linear or oblong, attenuated and comose at the apex; albumen scanty; cotyledons oblong-linear, flat; radicle superior.—DISTRIB. Tropical Asia, Australia, and New Zealand; species about 12.

1. **Parsonsia spiralis,** *Wall. Cat.* (1828) 1631. A perennial twining glabrous shrub. Leaves large, subcoriaceous, 3–6 by 1½–3½ in., elliptic or oblong-lanceolate, acuminate, glabrous, base rounded or acute; main nerves 6–8 pairs; petioles ½–¾ in. long. Flowers greenish, in paniculately corymbose axillary cymes 1½–3 in. in diam.; peduncles variable in length, 1–4 in. long; pedicels ¼–⅜ in. long; bracts minute, ovate, acute. Calyx ⅛ in. long, glabrous; lobes ⅛ in. long, ovate-triangular, subacute, each with a scale at the base inside. Corolla ⅜ in. long; tube pubescent inside; lobes rather longer than the tube, thick, oblong, obtuse. Disk of 5 triangular lobes. Stamens inserted in the tube near its base; filaments spirally twisted together, thickened and pubescent at the base; anthers ½-exserted. Fruit 5–7 by ¾ in., coriaceous, cylindric, sharply pointed, straight, glabrous, the constituent carpels at length separating. Seeds ½–⅝ in. long, linear, slender, narrowed at the tip, glabrous, striate, the hairs of the coma reaching 1½ in. long. Fl. B. I. v. 3, p. 650; Trim. Fl. Ceyl. v. 3, p. 134; Talb. Trees, Bomb. ed. 2, p. 227; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165. *Heligme Rheedei*, Wight, Icon. t. 1303; Dalz. & Gibs. p. 146. *Aganosma concanensis*, Hook. Icon. Pl. t. 841; Dalz. & Gibs. p. 147.—Flowers: Apr. VERN. *Nagal-kudá*.

KONKAN: *Stocks*!; S. Konkan, *Dalzell*!; Banda in the Wari country, *Dalzell & Gibson*. S. M. COUNTRY: Rámghát, *Ritchie*, 435! KANARA: southern Ghâts of N. Kanara, common, *Talbot*; Sirsi, *Woodrow*; Hulikal, *Bhiva*!—DISTRIB. India (Assam, Lower Bengal, Lower Birma, W. Peninsula); Ceylon, Malaya, China.

11. **VALLARIS,** Burm.

Twining shrubs. Leaves opposite, minutely dotted. Flowers white, in axillary or supra-axillary dichotomous cymes, sometimes reduced to fascicles. Calyx 5-partite, glandular or not inside; segments narrow. Corolla hypocrateriform or subrotate, the throat naked; lobes broad, overlapping to the right. Stamens inserted at the top of the corolla-tube; filaments very short or clavate; anthers exserted, acuminate, conniving in a cone round the stigma and adherent to it, the connective furnished with a more or less conspicuous fleshy tubercle at the back, the cells produced at the base into short rigid appendages. Disk annular or cupular, with 5 lobes or scales. Carpels of the ovary 2, at first connate; ovules many in each carpel; style filiform, pubescent; stigma thick, obscurely annulate near the base. Fruit oblong, acuminate, the carpels at length separating. Seeds 2-seriate, ovate, acuminate or beaked, compressed, comose at the apex; albumen scanty; cotyledons flat, thin; radicle superior.—DISTRIB. Tropical Asia and Malaya; species 5 or 6.

1. **Vallaris Heynei,** *Spreng. Syst.* v. 1 (1825) p. 635. A large woody climbing shrub; bark thick, yellowish-white, smooth. Leaves 2–4½ by 1–1½ in., elliptic-lanceolate or oblong lanceolate, acutely acuminate, usually glabrous, pellucid-dotted, base acute; petioles ⅓–½ in. long, with glands in the axils. Flowers white, fragrant, in axillary 3–10-flowered lax cymes; peduncles slender, glabrous or pubescent; pedicels pubescent, often decurved; bracts linear-lanceolate, acute, pubescent. Calyx pubescent, ⅛ in. long; lobes ⅒ in. long, ovate-oblong, obtuse or subacute, pubescent, a little shorter than the corolla-tube, ciliate. Corolla finely pubescent outside; limb nearly ¾ in. across, spreading, divided about ½-way down into 5 obovate obtuse lobes; corolla-tube ⅛ in. long. Anthers acute, connivent into a sharp cone, exserted; filaments broad, linear, pubescent. Disk with 5 oblong obtuse ciliate lobes. Ovary hairy; style hairy; stigma pointed. Fruit 4–6 by 1½–2 in., straight, somewhat acuminately pointed, fibrously striate. Seeds ½ in. long, ovoid, beaked; coma ¾ in. long of silvery-white hairs. Fl. B. I. v. 3, p. 650; Dalz. & Gibs. p. 144; Trim. Fl. Ceyl. v. 3, p. 135; Talb. Trees, Bomb. ed. 2, p. 227; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 6, part 4, p. 219. *Vallaris dichotoma,* Wall. Cat. 1621; Wight, Icon. t. 438.—Flowers: Dec.–Apr.

KONKAN! *Law!, Dalzell & Gibson.* DECCAN: *Dalzell & Gibson*; S. Deccan, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie,* 1114! KANARA: N. Kanara often in hedges, *Talbot*; Jagalbet, *Woodrow.*—DISTRIB. More or less throughout India, often cultivated; Ceylon.

12. **WRIGHTIA,** R. Br.

Shrubs or small trees, often with slender cord-like branches. Leaves opposite. Flowers red, white, or yellow, in terminal or pseudo-axillary cymes. Calyx short, 5-partite, with glands or scales inside. Corolla hypocrateriform; tube cylindric, usually short, with a corona of 5 or 10 erect usually fimbriate scales in the throat which are either distinct or united into a ring; lobes overlapping to the left. Stamens at the top of the corolla-tube; filaments short, dilated; anthers exserted, sagittate,

conniving around and adhering to the stigma, the cells with solid spurs at the base. Disk 0. Carpels of the ovary 2, free or connate; ovules many in each carpel. Follicles connate or distinct. Seeds linear, attenuated at the apex, with a deciduous coma at the lower end; albumen scanty or 0; cotyledons broad, convolute; radicle short, superior.—DISTRIB. Tropical Asia and Australia, 1 in Natal; species about 10.

Fruit rough with white tubercles, grooved at the junction of the carpels ..... 1. *W. tomentosa.*
Fruit without white tubercles, not grooved at the junction of the carpels ..... 2. *W. tinctoria.*

1. **Wrightia tomentosa,** *Roem. & Schult. Syst.* v. 4 (1819) p. 414. A small tree reaching 25–30 ft. high, abounding in yellow milky juice, with opposite divaricate scabrous branches; bark smooth, yellowish-grey; branchlets pubescent; young parts densely tomentose. Leaves 3–6 by 1½–2½ in., elliptic-oblong, acuminate, tomentose on both sides, drying dark-brown, base acute; main nerves 8–14 pairs; petioles ¼ in. long. Flowers malodorous, 1 in. or more across, in short dense erect terminal corymbose tomentose cymes, white when on the tree, turning yellow shortly after being gathered. Calyx pubescent outside, glandular inside; segments ⅛ in. long, broadly ovate, obtuse, with ciliate membranous margins. Corolla-tube ⅕–¼ in. long; lobes ½–⅝ in. long, oblong, rounded at the apex; corona orange, of 5–10 oblong, often laciniate scales. Fruit cylindric, *6–12 by ½ in.*, with a groove on each side at the junction of the carpels, rough with white tubercles. Seeds ½–⅔ in. long, slender, attenuated at the apex, with a deciduous white coma 1–1½ in. long at the lower end. Fl. B. I. v. 3, p. 653; Grah. Cat. p. 114; Dalz. & Gibs. p. 145; Wight, Icon. t. 443; Bedd. For. Man. in Flor. Sylvat. p. clix; Trim. Fl. Ceyl. v. 3, p. 137; Talb. Trees, Bomb. ed. 2, p. 228; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 6, part 4, p. 317. *Wrightia Wallichii*, A. DC. Prodr. v. 8, p. 405; Dalz. & Gibs. p. 145; Wight, Icon. t. 1296.—Flowers: Apr.–June. VERN. *Kálá-inderjav*; *Támbada-kudá.*

KONKAN: in moist forests, *Talbot*; common in the northern Ghâts, *Dalzell & Gibson*; Wari country, *Dalzell & Gibson*; Sawantvadi, *Woodrow.* KANARA: *Ritchie*, 1118!; Supa Ghâts rare, *Talbot*; Yacombi, *Woodrow.*—DISTRIB. Throughout Tropical India; Ceylon, Penang.

2. **Wrightia tinctoria,** *R. Br. in Mem. Wern. Soc.* v. 1 (1811) p. 74. A small deciduous tree; bark scaly, smooth; young parts glabrous or puberulous. Leaves variable, 3–6 by 1–2¼ in., elliptic-lanceolate or oblong-lanceolate, acuminate, glabrous or the young leaves puberulous beneath, base acute or rounded; main nerves 6–12 pairs; petioles ⅛–⅙ in. long. Flowers white, fragrant, in lax terminal cymes which are sometimes 5 in. in diam. with slender spreading dichotomous branches; bracts minute, ovate. Calyx glabrous, glandular inside; segments ⅒ in. long, oblong, rounded at the apex and with membranous margins. Corolla-tube short, ⅛ in. long; lobes ⅓ in. long, oblong, obtuse; corona of numerous linear scales, some inserted with the filaments and some on the corolla-lobes. Fruit of 2 distinct pendulous follicles, 10–20 by ¼–⅓ in., cylindric, slightly tapering to both ends, glabrous, striate, cohering at first at the tip only. Seeds ½–¾ in. long, pointed at the apex, with a deciduous coma often more than

1½ in. long at the base. Fl. B. I. v. 3, p. 653; Grah. Cat. p. 114; Dalz. & Gibs. p. 145; Bedd. Flor. Sylvat. t. 241; Talb. Trees, Bomb. ed. 2, p. 228; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Watt, Dict. Econ. Prod. v. 6, part 4, p. 316. *Wrightia Rothii*, G. Don, Gen. Syst. v. 4 (1837) p. 86; Wight, Icon. t. 1319.—Flowers: Mar.–May. VERN. *Kálá-kudá.*

KONKAN: *Law*!, *Gibson*, *Stocks*!; jungles south of Nagotna, *Dalzell & Gibson*; Thana, *Woodrow*; Matheran, *Cooke*! DECCAN: Khandala, *Cooke*!; near Karli village, *Gammie*. S. M. COUNTRY: Badami, *Cooke*!, *Woodrow*!—DISTRIB. India (Rajputana, Central Provinces, W. Peninsula); Ceylon, Timor.

The leaves furnish a kind of indigo and have been used by the natives of S. India for dyeing. The plant somewhat resembles *Holarrhena antidysenterica*, a valuable medicinal plant, and some confusion has arisen in consequence of the resemblance. The anthers of *Holarrhena* are included in the corolla-tube which is without a corona at its mouth, while the seeds of *Holarrhena* have the coma of hairs at the apex, those of *Wrightia* having the coma at the base of the seed. See Watt, Dict. Econ. Prod. l. c.

13. **BEAUMONTIA,** Wall.

Lofty scandent shrubs. Leaves opposite. Flowers very large, white, in terminal cymes; bracts caducous. Calyx 5-partite, glandular or not inside; segments large, foliaceous. Corolla infundibuliform or campanulate, throat naked; lobes broad, overlapping to the right. Stamens at the top of the tube, included; filaments thickened at the top; anthers sagittate, conniving round and adhering to the stigma, the cells spurred at the base. Disk deeply 5-lobed. Ovary 2-celled; ovules many in each cell; style filiform; stigma oblong-fusiform. Fruit long, thick, woody, at length separating into 2 follicles. Seeds compressed, ovate or oblong, attenuated at the apex and crowned by a coma; albumen thin; cotyledons foliaceous or thick; radicle short, superior.—DISTRIB. India and the Malay Archipelago; species 4.

1. **Beaumontia Jerdoniana,** *Wight, Icon.* (1850) tt. 1314–15. A large climbing shrub with woody stem; branches pale, glabrous. Leaves 6–9 by 2–4½ in., coriaceous, oblong-ovate, abruptly and shortly acuminate, glabrous, base acute; main nerves 8–15 pairs; petioles ½ in. long. Flowers very large, in terminal rusty-pubescent cymes; pedicels rusty-pubescent; bracts ovate, acute, deciduous. Calyx with 10 linear-subulate glands at the base inside, alternate with the segments; segments ¾–1 in. long, narrowly lanceolate, acute, pubescent and ciliate. Corolla white, 3–4 in. long, infundibuliform, wide above, gradually tapering towards the base; lobes about 1 in. long, obovate-oblong, rounded, mucronate. Anthers horny, sagittate, with spurs curving inwards at the base. Disk with 5 broadly ovate-oblong obtuse ciliate lobes. Follicles cylindric, 8–10 by 1–1½ in., somewhat tapering towards the apex, fibrously striate, glabrous. Seeds ½–⅞ in. long, ovate-lanceolate, compressed, with a coma of yellowish-white hairs reaching 2¼ in. long at the top. Fl. B. I. v. 3, p. 661; Talb. Trees, Bomb. ed. 2, p. 229; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166.—Flowers: Nov.–Dec.

KONKAN: *Stocks*!; Wari country, *Dalzell & Gibson*. S. M. COUNTRY: *Dalzell & Gibson*. KANARA: plentiful, *Dalzell & Gibson*; evergreen forests of the N. Kanara Ghâts, *Talbot*.—DISTRIB. India (W. Peninsula), apparently endemic.

Beaumontia grandiflora, Wall. Tent. Fl. Napal. (1826) t. 7. A gigantic climber, a native of Nipal, grown as an ornamental shrub in gardens and easily propagated by layering. It has obovate-oblong acuminate leaves 7–12 by 3–7 in. and a showy white corolla 3–5 in. long. Fl. B. I. v. 3, p. 660; Grah. Cat. p. 113; Dalz. & Gibs. Suppl. p. 52; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Gard. in Ind. ed. 5, p. 381; Watt, Dict. Econ. Prod. v. 1, p. 433.—Flowers: Dec.–Feb.

14. **CHONEMORPHA,** G. Don.

Scandent shrubs climbing over high trees. Leaves opposite, large and broad. Flowers large, white, in lax terminal and pseudo-axillary cymes. Calyx tubular, 5-fid, with a ring of glands at the base inside. Corolla hypocrateriform; tube cylindric, very narrow for a short distance from the base, then enlarged and continued so to the top; lobes 5, broad, overlapping to the right, twisted to the left. Stamens attached at the top of the narrow portion of the tube, included; filaments very short, broad; anthers sagittate, long, pungent, conniving round and adhering to the stigma, the cells spurred below. Disk thick, annular or cupular. Carpels of the ovary distinct; ovules numerous in each carpel; style filiform, cleft at the base; stigma thickened, dilated at the base with an annular membrane, with an apiculus at length 2-fid. Follicles elongate, straight, hard, 3–4-gonous. Seeds ovate or oblong, flat, shortly beaked, crowned with a long coma; albumen thin; cotyledons flat, thick, oblong; radicle short.—Distrib. India, Ceylon, and Malaya; species 2.

1. **Chonemorpha macrophylla,** *G. Don, Gen. Syst.* v. 4 (1837) p. 76. A large climbing shrub with copious milky juice; older branches stout, often covered with warty excrescences; younger branches hairy. Leaves very large, 6–12 by 5–10 in. or even more, broadly elliptic or suborbicular, usually shortly and abruptly acuminate, glabrous above, glabrous or more or less pubescent or tomentose and paler beneath, base usually cordate; main nerves 10–12 pairs, with reticulate veins between; petioles ¾–1½ in. long. Flowers large, sometimes 3 in. or more across, white, fragrant, in erect terminal racemose cymes; peduncles variable in length, 2–8 in. long; bracts ovate, acute, pubescent; young buds often much twisted to the left. Calyx glabrous or pubescent, divided about ½-way down; tube with a broad truncate base; lobes ovate, acute, slightly ciliate. Corolla 3 in. and more across; tube ¾–1 in. long, naked at the mouth, with 5 longitudinal villous bands inside behind the stamens; lobes 1½–1¾ in. long, obovate, cuneate, rounded at the apex, overlapping to the right. Anthers nearly ½ in. long, very acute, the cells with slightly divergent spurs at the base; filaments short, hairy. Follicles about 12 in. long, 3–4-gonous, pointed, glabrous. Seeds ¾ in. long, with a silvery-white coma 2 in. long at the apex. Fl. B. I. v. 3, p. 661; Grah. Cat. p. 113; Dalz. & Gibs. p. 146; Wight, Icon. t. 432; Trim. Fl. Ceyl. v. 3, p. 138; Talb. Trees, Bomb. ed. 2, p. 229; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prod. v. 2, p. 271.—Flowers: Apr.–Sept.

Konkan: *Law!, Talbot*; Banda in the Wari country, *Dalzell & Gibson*; jungles near Goa, *Dalzell!* Kanara: evergreen forests of N. Kanara, common in the Supa

forests, *Talbot*; Divimana, *Woodrow*; Kála naddi, *Ritchie*, 1842!—DISTRIB. Throughout India in moist forests; Ceylon, Malay Peninsula and Archipelago.

15. AGANOSMA, G. Don.

Stout evergreen climbing shrubs. Leaves opposite. Flowers middle-sized, in terminal tomentose cymes. Calyx divided to the base; sepals linear-lanceolate, acuminate, with subulate glands at the base inside. Corolla hypocrateriform; lower portion of tube short, cylindric, narrower than the upper campanulate or cylindric portion, the upper portion with bearded longitudinal bands behind the anthers; lobes linear or lanceolate, overlapping to the right, nearly straight in bud. Stamens at the base of the upper dilated portion of the corolla-tube, included; anthers sagittate, conniving over and adhering to the stigma, the cells spurred at the base. Disk cupular, 5-lobed. Carpels 2, distinct, the tips usually hirsute; ovules many in each carpel; style short; stigma truncate. Follicles distinct, terete, straight or curved, linear. Seeds ovate or linear-oblong, flattened, glabrous, not beaked, comose; albumen scanty; cotyledons oblong; radicle short.—DISTRIB. India and Malaya; species 6.

1. **Aganosma cymosa,** *G. Don, Gen. Syst.* v. 4 (1837) p. 77. A large woody much-branched climbing shrub; young branches appressedly pubescent. Leaves 2–3½ by 1–1¾ in., elliptic or elliptic-lanceolate, acute or acuminate, glabrous above, glabrous or pubescent beneath, base acute; main nerves 5–8 pairs; petioles ⅜-½ in. long. Flowers yellowish-white, in dense tomentose cymes; peduncles short; buds pointed, tomentose. Calyx divided to the base; sepals ⅜ in. long, linear-lanceolate, acute, tomentose on both sides. Corolla tomentose outside; lower narrow portion of the tube about $\frac{1}{16}$ in. long, the tube inflated above this portion, and with longitudinal hairy lines inside behind the anthers; lobes ¼ in. long, oblong-lanceolate, acute. Anthers ⅕ in. long, linear, acuminate, shortly spurred at the base. Carpels of the ovary distinct, hairy at the tip. Follicles 6–9 by ¼ in., linear, cylindric, pointed, at first pubescent, at length glabrous. Seeds ⅝ in. long, elliptic-oblong, compressed, not beaked; coma 1¼ in. long. Fl. B. I. v. 3, p. 665; Trim. Fl. Ceyl. p. 139; Talb. Trees, Bomb. ed. 2, p. 229; Watt, Dict. Econ. Prod. v. 1, p. 129. *Aganosma elegans*, G. Don, Gen. Syst. v. 4, p. 77; Wight, Icon. t. 1304. *Aganosma Doniana*, Wight, Icon. t. 1306 (a small-flowered specimen); Dalz. & Gibs. p. 146.—Flowers: Apr.–June.

KONKAN: *Law*! DECCAN: *Woodrow*!; Phunda Ghát, *Dalzell & Gibson*. KANARA: evergreen forests of N. Kanara, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon, China.

Aganosma caryophyllata, G. Don, Gen. Syst. v. 4 (1837) p. 77. A very large climbing shrub, a native of Lower Bengal, occasionally grown in gardens in Bombay and Poona. It has a woody stem as thick as a man's leg, ovate subcordate leaves 4–5 in. long, and pure-white fragrant flowers about 1¾ in. across, appearing in the rains. It rarely produces seed in the Deccan, but is easily propagated by layering. Fl. B. I. v. 3, p. 664; Grah. Cat. p. 113; Dalz. & Gibs. Suppl. p. 51;

Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Gard. in Ind. ed. 5, p. 381; Watt, Dict. Econ. Prod. v. 1, p. 129.—VERN. *Malati*; *Kemettivalli.*

16. **ANODENDRON,** A. DC.

Scandent glabrous shrubs. Leaves opposite. Flowers small, in axillary or axillary and terminal slender laxly paniculate cymes. Calyx small, 5-cleft, glandular or not inside. Corolla hypocrateriform, the mouth contracted, without scales inside; lobes 5, narrow, overlapping to the right, twisted to the left. Stamens included, below the middle of the corolla-tube; filaments very short; anthers sagittate, conniving round and adhering to the stigma, the cells shortly spurred at the base. Disk annular or cupular. Carpels of the ovary 2, distinct, sunk in the disk and attached to it by their backs at the base; ovules numerous in each carpel; style very short; stigma thick, conical. Follicles divaricate, acuminate, hard. Seeds compressed, ovoid or oblong, beaked, tipped with a long coma.—DISTRIB. India, Malaya; species 7.

1. **Anodendron paniculatum,** *A. DC. Prodr.* v. 8 (1844) p. 444. A very large branched woody twining shrub; stems fluted, stout; bark brown, thick, rather smooth; young parts glabrous. Leaves 3½–6 by 1½–2½ in., thinly coriaceous, elliptic or oblong, shortly and abruptly acuminate, glabrous and shining, base usually rounded; main nerves 12–15 pairs, parallel, slender; petioles ¼–⅝ in. long, stout. Flowers yellow, small, numerous, in large lax trichotomously branched terminal and axillary glabrous paniculate cymes with filiform brachiate branches; bracts ovate, acute, glabrous; pedicels ⅛–¼ in. long, slender, glabrous. Calyx glabrous, divided about or rather more than ½-way down; lobes 1/20 in. long, ovate, subacute. Corolla-tube 1/10 in. long, pubescent inside, very slightly enlarged a little above the base over the stamens; lobes ⅛ in. long, linear, obtuse, slightly falcate, with a few scattered white hairs on the upper surface, overlapping to the right, much twisted to the left in bud. Stamens near the base of the corolla-tube; filaments short, broad; anthers sagittate, 1/40 in. long, spurs short, divergent. Stigma subsessile, conical, pointed. Follicles 4–6 in. long, straight, narrowed from a base ¾ in. in diam. to an obtuse point, glabrous, terete, hard and woody. Seeds 8–12, elliptic-lanceolate, compressed, 1–1¼ in. long, of which ¼ in. is beak, reddish-brown; coma white, 2 in. and more long, copious. Fl. B. I. v. 3, p. 668; Dalz. & Gibs. p. 147; Trim. Fl. Ceyl. v. 3, p. 141; Talb. Trees, Bomb. ed. 2, p. 230; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prod. v. 1, p. 255. *Echites paniculata,* Roxb. Fl. Ind. v. 2, p. 17; Wight, Icon. t. 396. *Gymnema nepalense,* Grah. Cat. p. 120 (*not* of Wall.).—Flowers: Dec.–Mar. VERN. *Lámtáni.*

Common on the Ghâts. KONKAN: *Law*!, *Stocks*!; Matheran, *Cooke*! DECCAN: Khandala, *Graham*; Karli, *Ranade*!, *Gammie*; Lanoli, *Woodrow.* KANARA: common in the evergreen forests of N. Kanara, *Talbot.*—DISTRIB. India (Silhet, W. Peninsula); Ceylon, Java, Timor, Philippine Islands.

17. **ICHNOCARPUS,** R. Br.

Climbing shrubs. Leaves opposite. Flowers small or minute, in lax many-flowered terminal and axillary paniculate cymes. Calyx 5-fid,

glandular or not inside. Corolla hypocrateriform, the throat contracted or villous; lobes narrowed to an obtuse point, overlapping to the right, the upper half of each lobe deflexed in bud. Stamens at or below the middle of the corolla-tube; anthers sagittate, conniving over and adhering to the stigma, the cells spurred at the base. Disk free, 5-lobed. Carpels of the ovary 2, distinct, exserted from the disk, hairy; ovules many in each carpel; style short; stigma ovoid or oblong. Follicles spreading or divaricate, slender. Seeds narrowed at the tip, crowned with a deciduous coma; albumen copious; cotyledons long, flat; radicle short, superior.—DISTRIB. India, Malaya, Australia; species 5 or 6.

1. **Ichnocarpus frutescens,** *Ait. Hort. Kew.* ed. 2, v. 2 (1811) p. 69. A large much-branched twining shrub; young branches finely fulvous-tomentose. Leaves $1\frac{3}{4}$–3 by $\frac{3}{4}$–$1\frac{1}{2}$ in., elliptic-oblong, acute or acuminate, glabrous above, glabrous or slightly pubescent and pale beneath, base usually rounded; main nerves 5–7 pairs, with finely reticulate venation between; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long. Flowers greenish-white, numerous, in axillary and terminal rusty-pubescent trichotomous pedunculate cymes; pedicels $\frac{1}{8}$–$\frac{1}{6}$ in. long, often 3 together, rusty-pubescent. Calyx fulvous-hairy, divided $\frac{1}{2}$-way down; lobes ovate, acute, without glands inside. Corolla-tube $\frac{1}{10}$–$\frac{1}{8}$ in. long with a narrow portion below about $\frac{1}{30}$ in. long, the middle portion of the tube much inflated (almost globular) over the stamens, the upper portion constricted below the lobes; lobes $\frac{1}{5}$ in. long, pubescent on the upper side with white hairs, broad and oblong at the base, produced at the apex into a long falcate slender twisted acumen which is deflexed in bud and flower. Disk of 5 erect linear lobes, longer than the hairy ovary. Follicles 4–6 by $\frac{1}{6}$ in., straight or slightly curved, very slender, cylindric, rusty-pubescent at first, afterward glabrous. Seeds $\frac{1}{2}$–$\frac{3}{4}$ in. long, linear, black, not beaked; coma as long as the seed, scanty, white. Fl. B. I. v. 3, p. 669; Grah. Cat. p. 113; Dalz. & Gibs. p. 147; Wight, Icon. t. 430; Trim. Fl. Ceyl. v. 3, p. 142; Talb. Trees, Bomb. ed. 2, p. 230; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prodr. v. 4, p. 326.—Flowers: Nov.–Dec. VERN. *Krishnasarvá.*

KONKAN: Wari country, *Dalzell & Gibson.* S. M. COUNTRY: *Law* ex *Graham*; Castlerock, *Bhiva*!; Dharwar, *Cooke*! KANARA: common in the evergreen forests of N. Kanara, *Talbot.*—DISTRIB. More or less throughout India; Ceylon, Java, Australia.

The following plants of the Order not belonging to any of the foregoing genera are more or less cultivated in the Presidency:—

Plumeria acutifolia, Poir. Encyc. Méthod. Suppl. v. 2 (1811) p. 667. A small tree, a native of Tropical America, cultivated and become naturalized more or less throughout India. It has oblong leaves 8–10 in. long, acute at both ends and only borne during the rainy season. The flowers are white with a golden centre, very fragrant. The plant rarely produces seed in the Bombay Presidency, but is readily propagated by layering and is common about villages. Unsuccessful attempts have been made to manufacture caoutchouc from the tenacious milky juice which exudes plentifully from the tree when wounded. Fl. B. I. v. 3,

p. 641; Dalz. & Gibs. Suppl. p. 52; Talb. Trees Bomb. ed. 2, p. 225; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 165; Gard. in Ind. ed. 5, p. 377; Watt, Dict. Econ. Prod. v. 6, part 1, p. 297. *Plumeria acuminata*, Ait. Hort. Kew. ed. 2, v. 2, p. 70; Grah. Cat. p. 115.—VERN. *Khera-cháphá*; *Pándhrá-cháphá*.

The bark and milky juice are used in native medicine. See Watt, Dict. Econ. Prod. l. c.

Plumeria alba, Linn. Sp. Pl. (1753) p. 210. A native of the West Indies. Thrives under the same conditions as *Plumeria acutifolia*, but is a much less common tree, retains its leaves longer and has pure white flowers. Woodr. in Journ. Bomb. Nat. v. 12, p. 165; Gard. in Ind. ed. 5, p. 377.

Nerium odorum, Soland. in Hort. Kew. ed. 1, v. 1 (1789) p. 297. A native of the W. Himalaya and Nipal, grown in gardens throughout the Presidency and sometimes found as an escape, though not truly wild, on the banks of streams in the Deccan. It is widely planted in Sind, but not indigenous. The leaves are 4–6 in. long, linear-lanceolate, and the flowers fragrant, 1½ in. in diam., their color varying from pure white to dark-red. Fl. B. I. v. 3, p. 655; Grah. Cat. p. 114; Talb. Trees, Bomb. ed. 2, p. 228; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Gard. in Ind. ed. 5, p. 376; Watt, Dict. Econ. Prod. v. 5, p. 348.—Flowers more or less throughout the year. VERN. *Kanher*.

Roupellia grata, Wall. & Hook. in Bot. Mag. (1849) t. 4466. A stout climbing shrub reaching 20 ft., a native of Sierra Leone, grown in Deccan gardens. It has opposite shining elliptic leaves and produces, during the hot season, large terminal cymes of pale rose-colored flowers 2 in. across, with a ring of processes rising from the thick corolla-lobes. Dalz. & Gibs. Suppl. p. 52; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Gard. in Ind. ed. 5, p. 378.—Flowers: Mar.

Strophanthus Wallichii, A. DC. Prodr. v. 8 (1844) p. 418. A climbing shrub a native of the Khasia hills and the Circars, occasionally grown in gardens. It has elliptic-oblong or obovate leaves, red and white flowers with tails to the corolla-lobes 2–3 in. long. Fl. B. I. v. 3, p. 655. *Strophanthus dichotoma*, Wall. Cat. 1641 (*not* of DC.); Wight, Icon. t. 599; Grah. Cat. p. 114; Dalz. & Gibs. Suppl. p. 52. *Nerium caudatum*, Roxb. Hort. Beng. (1814) p. 84.

Adenium obesum, Roem. & Schult. Syst. v. 4 (1819) p. 411. A curious looking plant found on the dry rocky land about Aden, grown, though rarely, in gardens in the Deccan. It is of slow growth and has a thick gouty stem rapidly diminishing to short stout branches, which in the hot season bear bright rosy oleander-like flowers. The leaves appear after the flowers. The plant thrives in the Deccan in a soil composed of a mixture of good loam with crushed bricks. It bears pods freely, but does not often ripen seed. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Gard. in Ind. ed. 5, p. 380. *Nerium obesum*, Forsk. Fl. Aegypt.-Arab. (1775) p. 205; Dalz. & Gibs. Suppl. p. 52.—Flowers: Mar.–Apr. VERN. *Adenachakanher*.

Thevetia neriifolia, Juss. ex Steud. Nom. ed. 2, v. 2 (1841) p. 680. A very common bush or sometimes a small tree, a native of South America and the West Indies, often, in consequence of its rapid growth, used for hedges. It has oleander-like leaves, yellow fragrant flowers, and a fruit the size of a crab-apple. It is sometimes called the *Yellow Oleander*. Watt, Dict. Econ. Prod. v. 6, part 4, p. 47. *Cerbera Thevetia*, Linn. Sp. Pl. (1753) p. 209; Grah. Cat. p. 116; Dalz. & Gibs. Suppl. p. 53; Woodr. Gard. in Ind. ed. 5, p. 378.—VERN. *Pivala-kanher*.

The milky juice of the tree and the kernels of the fruit are poisonous; the bark is bitter and has some repute as a febrifuge. See Watt, Dict. Econ. Prod. l. c.

Allamanda cathartica, Linn. Mantiss. v. 2 (1771) p. 214. A scandent milky shrub a native of Guiana, grown in gardens in the Bombay Presidency and commonly throughout India, probably introduced into Bombay by the Portuguese (*Dalzell*). It has become almost wild near Goa. It has obovate-lanceolate acuminate leaves, 4 in a whorl, and large yellow flowers about 3 in. long. Rarely produces seed in the Bombay Presidency. Watt, Dict. Econ. Prod. v. 1, p. 168. *Allamanda Aubletii*, Pohl, Pl. Bras. v. 1 (1827) p. 75; Grah. Cat. p. 116; Dalz. & Gibs. Suppl. p. 53.—Flowers more or less throughout the year.

Allamanda neriifolia, Hook. in Bot. Mag. (1851) t. 4594. An erect evergreen glabrous shrub 3 ft. high, a native of S. America, often grown in gardens. It has opposite or whorled oblong leaves and deep golden-yellow flowers elegantly streaked with orange. Woodr. Gard. in Ind. ed. 5, p. 379.

ORDER LXXXIII. ASCLEPIADACEÆ.

Herbs or shrubs frequently twining, often with milky juice. Leaves opposite or whorled, rarely alternate (absent in *Sarcostemma*), entire; stipules 0. Flowers hermaphrodite, regular, solitary or few or many together, in umbels, umbellate cymes, fascicles or racemes, axillary, lateral (between the bases of the leaves) or terminal. Calyx inferior, usually divided to the base or nearly so; segments imbricate, usually with minute processes or glands at the base inside. Corolla various, hypogynous, gamopetalous, 5-lobed; tube usually short (long in *Ceropegia*), often furnished within or at its mouth with a ring of scales or processes (*corolline corona*); lobes imbricate, contorted or valvate in æstivation, often recurved or connate at their tips. Stamens 5, inserted at or near the base of the corolla and alternating with its lobes; filaments rarely free, usually connate into a fleshy tube (*staminal-column*), with its apex often united to the dilated part of the style, usually with fleshy scales or processes on the back (*staminal corona*); anthers free or united to the dilated part of the style, 2-celled, the margins of the anthers or their basal prolongations below the cells more or less horny and wing-like (*anther-wings*), usually projecting outwards, the adjacent wings of each pair of anthers nearly meeting and forming narrow fissures leading to the stigmatic cavities; connectives of the anthers often produced into membranous terminal appendages which are sometimes connate; pollen forming one or two granular or waxy masses (*pollinia* or *pollen-masses*) in each cell, the pollinia of the

adjoining cells of two contiguous anthers united in pairs or fours either directly or by appendages (*caudicles*) to each of the 5 minute turgid or 2-fid bodies (*pollen-carriers* or *corpuscles*) which lie on the dilated part of the style. Ovary superior, of 2 one-celled distinct carpels enclosed within the staminal-column, with their styles united above into a disk (*style-apex* or *style-table*) which is 5-angled, short and included between the anthers, or is produced beyond them into a long or short simple or 2-fid column; ovules usually numerous, rarely few or solitary, anatropous, pendulous, imbricate in several series on the projecting placenta. Fruit of 2 follicles (1 sometimes suppressed). Seeds compressed, usually flat, often margined, crowned with a tuft of long hairs (*coma*) at one end; albumen thin or 0; embryo large; cotyledons flat; radicle short, superior.—DISTRIB. A large Order of more than 1800 species spread through tropical and subtropical regions of the world, a few in temperate regions.

Filaments usually free; pollen-masses granular.
- Corolla-lobes valvate ..... 1. HEMIDESMUS.
- Corolla-lobes overlapping to the right.
  - Corona of 5 free fleshy lobes ..... 2. CRYPTOLEPIS.
  - Corona-lobes connate into a ring ..... 3. PERIPLOCA.

Filaments connate into a tube; pollen-masses waxy.
- Anthers with a membranous appendage.
  - Pollen-masses 2 in each anther-cell (20 in all).
    - Corolla-lobes overlapping to the right ..... 4. TOXOCARPUS.
    - Corolla-lobes valvate ..... 5. GENIANTHUS.
  - Pollen-masses 1 in each anther-cell (10 in all).
    - Pollen-masses pendulous.
      - Corona corolline ..... 6. GLOSSONEMA.
      - Corona staminal.
        - Stem erect ..... 7. CALOTROPIS.
        - Stem twining.
          - Corona single, of 5 lobes.
            - Corolla divided ½-way down ... 8. OXYSTELMA.
            - Corolla divided almost to the base ..... 9. PENTATROPIS.
          - Corona double.
            - Follicles with soft spines ..... 10. DÆMIA.
          - Corona single, annular or cupular.
            - Twining or erect leafy shrubs.
              - Flowers large; corona a fleshy ring with truncate margin; follicles thick, obtuse ..... 11. HOLOSTEMMA.
              - Flowers small; corona a plicate ring with lobed or toothed margin; follicles narrow, tapering ..... 12. CYNANCHUM.
            - Trailing leafless shrubs ..... 13. SARCOSTEMMA.
    - Pollen-masses erect, rarely horizontal, never pendulous.
      - Corona corolline ..... 14. GYMNEMA.
      - Corona staminal, rarely 0.
        - Corolla-lobes overlapping.
          - Corona of 5 distinct lobes or tubercles.
            - Corona-lobes tubercle-like and entirely adnate to the staminal-column or radiating from its base ..... 15. TYLOPHORA.

Corona-lobes with their basal part adnate to the staminal-column, shortly free above.
Corona-lobes with a subulate process on the inner face of their free apical part ..... 16. PERGULARIA.
Corona-lobes without a subulate process on the inner face of their free apical part ..... 17. MARSDENIA.
Corona-lobes scale-like, bifid at their apex; style-apex with a distinct rim ..... 18. COSMOSTIGMA.
Corolla-lobes valvate.
Corolla rotate.
Leaves thin; corona small, stellate ..... 19. HETEROSTEMMA.
Leaves thick and fleshy; corona large, stellate..... 20. HOYA.
Corolla urceolate or disciform; corona cupular, fleshy ..... 21. OIANTHUS.
Anthers incumbent on the style-apex without a membranous appendage.
Corona double, corolline and staminal.
Calyx turbinate, 5-lobed; corolla rotate ..... 22. LEPTADENIA.
Corona double, staminal.
Leafy herbs.
Corolla-tube long .... 23. CEROPEGIA.
Corolla rotate..... 24. FREREA.
Leafless or almost leafless herbs with fleshy 4-angled stems and branches ..... 25. CARALLUMA.

1. **HEMIDESMUS,** R. Br.

Twining shrubs. Leaves opposite. Flowers small, greenish-purple, in axillary opposite crowded subsessile cymes. Calyx 5-partite, with glands inside at the base; segments acuminate. Corolla rotate, deeply 5-fid, fleshy; tube very short; lobes thick, valvate. Corona-scales 5, short, thick, on the throat of the corolla and alternate with its lobes. Stamens inserted at the base of the corolla-tube; filaments distinct or subconnate at the base; anthers small, cohering at the apex, terminated by an inflexed membrane; pollen-masses cohering in pairs in each cell, granular, the caudicles of the pollen-carriers dilated or hooded. Style-apex 5-gonous, flat on the top. Follicles divaricate, long, slender, terete, smooth. Seeds comose.—DISTRIB. India; species 1.

1. **Hemidesmus indicus,** *R. Br. in Mem. Wern. Soc.* v. 1 (1811) p. 57. A perennial prostrate or twining shrub; rootstock woody; stems numerous, slender, terete, glabrous or pubescent, striate, thickened at the nodes. Leaves very variable, from elliptic-oblong to linear-lanceolate, 2–4 in. long, but of very variable breadth (from $\frac{1}{3}$–$1\frac{1}{2}$ in.), apiculate, the narrow leaves acute, the broad ones often obtuse at the apex, glabrous, dark-green, often variegated with white above, pale and sometimes silvery-white and pubescent beneath, with reticulate veins; petioles $\frac{1}{8}$–$\frac{1}{6}$ in. long. Flowers crowded in subsessile cymes in the opposite axils; pedicels short, clothed with numerous ovate acute imbricating bracts. Calyx $\frac{1}{10}$ in. long, glabrous outside; lobes $\frac{1}{16}$ in.

long, ovate, acute, with membranous ciliolate margins. Corolla $\frac{1}{5}$–$\frac{1}{4}$ in. long, greenish outside, purple inside; tube very short; lobes valvate, fleshy, $\frac{1}{6}$ in. long, ovate-oblong, acuminate. Follicles 4–6 by $\frac{1}{4}$ in., cylindric, tapering to a point at the apex, straight or sometimes slightly curved, striate, glabrous. Seeds $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovate-oblong, flattened, black; coma silvery-white, 1 in. long. Fl. B. I. v. 4, p. 5; Grah. Cat. p. 122; Dalz. & Gibs. p. 147; Wight, Icon. t. 594; Trim. Fl. Ceyl. v. 3, p. 144; Talb. Trees, Bomb. ed. 2, p. 232; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prod. v. 4, p. 219.—Flowers throughout the greater part of the year. VERN. *Anantvel*; *Uparsul*.

A tolerably common plant throughout the Presidency, often found in hedges. KONKAN: *Stocks*!, *Law*!; Malabar hill (Bombay) and Wargaon, *Graham*. DECCAN: Poona, *Kanitkar*!; hills 10 miles W. of Poona, *Bhiva*! S. M. COUNTRY: Belgaum, *Ritchie*, 427!; Castlerock, *Bhiva*!

The root has been employed as a substitute for sarsaparilla and in 1864 was made officinal in the British Pharmacopœia. See Watt, Dict. Econ. Prod. l. c.—DISTRIB. India (Northern Provinces, Western Peninsula); Ceylon.

2. **CRYPTOLEPIS,** R. Br.

Glabrous shrubs usually twining. Leaves opposite. Flowers small, in axillary lateral or terminal lax usually few-flowered pedunculate cymes. Calyx 5-partite. Corolla-tube short, cylindric or campanulate; lobes 5, overlapping to the right in bud; corona of 5 filiform or fleshy lobes or processes arising from about the middle of the corolla-tube. Stamens inserted towards the base of the corolla-tube; filaments free; anthers more or less triangular, with the connective produced into a fleshy apiculus, united at their base to the dilated part of the style, more or less connivent into a cone; pollen-masses granular, cohering in pairs in each cell; pollen-carriers more or less spathulate. Style-apex shortly conical, not exserted beyond the anthers. Follicles divaricate, terete, smooth. Seeds comose.—DISTRIB. Africa and Tropical Asia; species about 20.

1. **Cryptolepis Buchanani,** *Roem. & Schult. Syst.* v. 4 (1819) p. 409. A large twining shrub; branches terete, pale, glabrous. Leaves 3–5 by $1\frac{1}{2}$–$2\frac{1}{2}$ in., elliptic-oblong or sometimes oblong-lanceolate, rounded, retuse, or sometimes acute, apiculate, green above, whitish beneath, glabrous, base usually acute; main nerves numerous, slender, nearly at right angles to the midrib, uniting in an intramarginal nerve; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers greenish-yellow, in short paniculate cymes; pedicels glabrous; bracts ovate, acute, with scarious margins. Calyx glabrous; segments $\frac{1}{16}$ in. long, ovate, subacute. Corolla-tube $\frac{1}{12}$ in. long; lobes $\frac{1}{4}$ in. long, linear or linear-lanceolate, subacute; corona-scales clavate. Follicles 2–4 in. long, straight, rigid, divaricate, gradually tapering to a blunt point from about the middle, where they are $\frac{1}{2}$–$\frac{3}{4}$ in. in diam. Seeds $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovate-oblong, black; coma rather more than 1 in. long. Fl. B. I. v. 4, p. 5; Dalz. & Gibs. p. 148; Wight, Icon. t. 494; Trim. Fl. Ceyl. v. 3, p. 145; Talb. Trees, Bomb. ed. 2, p. 232; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prod. v. 2, p. 642.—Flowers: June–Aug. VERN. *Karanta*; *Setakávali*.

KONKAN: *Law*!, *Stocks*!, *Dalzell*!; Elephanta, *Dalzell & Gibson*. DECCAN: widely, *Woodrow*; Poona, *Woodrow*; Bhakam near Poona, *Bhiva*! S. M. COUNTRY: Belgaum, *Bhiva*!, *Cooke*!, *Ritchie*, 436! KANARA: *Talbot*; Kála naddi, *Ritchie*, 436!—DISTRIB. Throughout India; Ceylon.

3. **PERIPLOCA,** Linn.

Erect or twining shrubs, sometimes leafless. Leaves when present opposite. Flowers in lax axillary or terminal cymes. Calyx 5-partite. Corolla rotate; lobes 5, usually bearded inside, overlapping to the right; corona a 10-lobed ring arising from the corolla a little above the stamens, often produced behind the stamens into 5 subulate or branched processes. Stamens inserted a little above the base of the corolla within the corona; filaments free, broad, short; anthers bearded on the back or at the base, conniving over and adhering to the style-apex, the connective produced into an apiculus by which they are usually connate at the tips; pollen-masses in pairs in each cell (20 in all), granular. Style-apex convex or subtruncate. Follicles smooth. Seeds comose.—DISTRIB. S. Europe, Asia, Africa; species about 12.

1. **Periploca aphylla,** *Decaisne, in Jacquem. Voy. Bot.* (1844) p. 109, t. 116. An erect branched milky shrub, very commonly leafless; stems many, 6–10 ft. long, rarely as thick as a goose-quill, twiggy, glabrous; bark greenish, rugosely striate. Leaves when present ¼ in. long, ovate-oblong, acute, thick, nerveless. Flowers fragrant, numerous, in glabrous cymes (often opposite) ½–1 in. long and broad, on short thick peduncles or branched from the base; bracts ovate-oblong, subobtuse, with scarious margins, breaking off about the middle and leaving the lower thick portion; buds globose. Calyx ⅛ in. long, glabrous; segments $\frac{1}{10}$ in. long, broadly ovate-oblong, obtuse, with scarious margins. Corolla greenish outside, dark-purple within; tube very short; lobes ⅙–¼ in. long, oblong, obtuse, densely bearded inside near the apex, reflexed; corona-lobes ¼ in. long, the basal portion transversely oblong, truncate, the apical portion filiform, recurved at the apex. Filaments of the stamens glabrous; anthers deltoid-ovate, hairy on the back. Follicles on short thick peduncles, widely divergent, 3–4 by ¼ in., rigid, woody, terete, pointed. Seeds ¼ in. long; coma 1 in. long. Fl. B. I. v. 4, p. 12; Aitch. Pb. & Sind Pl. p. 90; Talb. Trees, Bomb. ed. 2, p. 233; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prod. v. 6, part 1, p. 140.—Flowers: Mar.–Apr. VERN. *Ransher*.

In the Bombay Presidency confined apparently to Sind. SIND: *Stocks*!, *Vicary*!; Thano-Bula-Khán, *Woodrow*.—DISTRIB. India (Panjáb); Afghanistan, Beluchistan, Persia, Arabia, Egypt.

The milky juice is used in Sind as an external application to tumors, the fibre of the stems for making ropes for wells, and the fragrant flowers are eaten, tasting, according to Stocks, like raisins. See Watt, Dict. Econ. Prod. l. c.

4. **TOXOCARPUS,** Wight & Arn.

Twining shrubs. Leaves opposite. Flowers small, in axillary dichotomous paniculate cymes. Calyx minute, 5-partite. Corolla-tube short; lobes 5, linear-oblong, recurved, glabrous, overlapping to the left; corona staminal, of 5 dorsally flattened lobes arising from the back of the filaments, alternating with the corolla-lobes. Stamens inserted at the

bottom of the corolla; filaments connate; anthers small, erect or conniving round the style-apex, usually with a minutely fimbriate submembranous border; pollen-masses minute, 2 in each cell (20 in all), pendulous, waxy. Style-apex produced into a long slender erect beak. Follicles smooth. Seeds comose.—DISTRIB. Tropical Asia and Africa; species about 15.

1. **Toxocarpus Kleinii,** *Wight & Arn. in Wight, Contrib.* (1834) p. 61. A twining shrub; young parts rufous-hairy; stem long, more or less rufous-tomentose. Leaves 2½–3½ by 1¼–2¼ in., ovate-elliptic or obovate, sometimes lanceolate, shortly acuminate, glabrous above, glabrous or pubescent beneath, base acute; main nerves 4–5 pairs, slender, with reticulate veins between; petioles ⅓–½ in. long, pubescent. Flowers in rusty-pubescent paniculate axillary cymes; pedicels variable in length, sometimes nearly ½ in. long, sometimes almost 0, rufous-pubescent; bracts linear-oblong, obtuse, hairy. Calyx rufous-hairy; segments ⅛ in. long, ovate-oblong, obtuse or subacute, with scarious margins. Corolla glabrous; tube ⅛ in. long; lobes ¼–⅓ in. long, strap-shaped, much recurved, overlapping to the left in bud. Beak of style-apex long, slender. Follicles 3–6 by ¼–⅓ in., tapering to a point at the apex, slightly curved, glabrous. Seeds ⅓ in. long, ovate-lanceolate, scarcely beaked; coma 1 in. long. Fl. B. I. v. 4, p. 14; Grah. Cat. p. 122; Wight, Icon. t. 886; Talb. Trees, Bomb. ed. 2, p. 233; Trim. Fl. Ceyl. v. 3, p. 146. —Flowers: Nov.–Mar.

A rare plant in the Bombay Presidency. KONKAN: *Stocks!, Law!, Talbot*; Salsette, *Graham.*—DISTRIB. India (W. Peninsula); Ceylon.

Toxocarpus concanensis, Hook. f. Fl. B. I. v. 4 (1883) p. 14, with obovate-elliptic cuspidate mottled glabrous or pubescent leaves 3–5 by 2½–3 in., is given in the Flora of British India as occurring in Kanara (though not found there by Mr. Talbot), and as occurring in the Bababudan hills (which are outside our area), *fide* Mr. Law. Except in the size of the leaves it does not seem to differ from *T. Kleinii.*

5. GENIANTHUS, Hook. f.

Twining shrubs. Leaves opposite. Flowers small, in axillary subsimple or dichotomously branched cymes. Calyx minute; lobes oblong, obtuse. Corolla-tube short; lobes narrow, spreading and recurved, usually villous to the tip on the inner face, valvate; corona of 5 scales adnate to the column. Staminal-column minute; pollen-masses 2 in each cell (20 in all), minute, waxy. Style-apex sessile and capitate, or long and slender.—DISTRIB. Tropical Asia and Malaya; species 3 or 4.

A new genus described by Sir J. Hooker in Fl. B. I. v. 4 (1883) p. 15. The genus is distinguished from *Toxocarpus* by the bearded corolla-lobes and their valvate æstivation.

1. **Genianthus laurifolius,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 16. A twining shrub; stem terete, striate, pustular, glabrous. Leaves 3–4 by 1½–2½ in., broadly elliptic, acuminate, glabrous, base acute; main nerves 8–10 pairs, slender; petioles ½–⅞ in. long. Flowers in axillary slender branched paniculate cymes, of 2 forms on the same cyme, one with narrow linear obtuse reflexed corolla-lobes densely bearded inside, the other with broader oblong segments nearly glabrous inside, scarcely reflexed; pedicels short or 0. Calyx pubescent outside; segments

$\frac{1}{20}$ in. long, oblong, obtuse. Corolla-lobes about $\frac{1}{10}$ in. long; tube scarcely any. Follicles 3-5 by $\frac{1}{4}$ in., slender, terete, curved, pointed, often pustular. Seeds 1 in. long, linear-lanceolate, flattened, not beaked, dark-brown; coma $\frac{3}{4}$ in. long. Talb. Trees, Bomb. ed. 2, p. 233; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166. *Toxocarpus crassifolius*, Dalz. & Gibs. p. 148. *Toxocarpus laurifolius*, Wight, Contrib. p. 61, and Icon. t. 598.—Flowers: Oct.-Dec.

KONKAN: *Stocks*!, *Dalzell*! KANARA: N. Kanara Ghâts in evergreen forests, common in the forests near the Nilkund and Gairsoppa Ghâts, *Talbot*.—DISTRIB. India (Sikkim Himalaya, W. Peninsula).

6. GLOSSONEMA, Decaisne.

Dwarf perennial (rarely annual) herbs, often hoary, branched from the base. Leaves opposite. Flowers small, in few-flowered lateral or sublateral cymes arising from between the base of the petioles, rarely solitary. Calyx 5-partite. Corolla subcampanulate; tube short; lobes 5, suberect or spreading, overlapping to the right; corona arising from the corolla-tube a little above the origin of the staminal-column, of 5 broad hyaline obtuse or acute entire or bifid lobes alternating with the corolla-lobes. Staminal-column short; anthers terminated by an inflexed membrane; pollen-masses pendulous, solitary in each anther-cell, attached in pairs to the pollen-carriers by short almost obsolete caudicles. Style-apex usually exserted beyond the anthers, fleshy, conical, clavate or peltate. Follicles thick, acuminate, usually echinate. Seeds comose. —DISTRIB. India (Sind), Tropical Africa, Arabia; species 6.

1. **Glossonema varians,** *Benth. in Benth. & Hook. f. Gen. Pl.* v. 2 (1876) p. 748. A small erect annual herb 4–6 in. high, much branched from near the base; branches pubescent. Leaves fleshy, hairy on both sides, 1–2½ by ¾–2 in., the lower leaves rotund-ovate, subcordate, obtuse or retuse, the upper elliptic, acuminate; margins entire or crisped; petioles ¼–⅞ in. long. Flowers fragrant, white or yellow, in subsessile umbellate 2–8-flowered cymes; pedicels very short; buds ovoid. Calyx hairy, divided nearly to the base; segments ⅛ in. long, linear, acute, ciliate. Corolla ¼ in. long, glabrous; lobes ⅛–⅙ in. long, oblong, obtuse, veined; corona-lobes about $\frac{1}{10}$ in. long, erecto-patent, entire or bifid at the apex. Pollen-masses attached to the pollen-carriers by very short caudicles. Style-apex conical, fleshy, much exserted. Follicles 1–2 in. long, ellipsoid, beaked, attenuated at the base, covered with short soft scattered spines and minutely cano-pubescent. Seeds ⅙–¼ in. long, broadly ovate, acute, much flattened, and with very thin (almost papery) margins, sinuate-dentate at the broader end (*Stocks*), yellowish-brown; coma ½ in. long, white. Fl. B. I. v. 4, p. 16; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166. *Mastostigma varians*, Stocks, in Hook. Icon. Pl. v. 9 (1852) t. 863; Aitch. Pb. & Sind Pl. p. 89.—Flowers: Dec. VERN. *Munga*.

In the Bombay Presidency confined to Sind. SIND: *Vicary*!, *Dalzell*!, *Bhola Puran*!, *Woodrow*; Jemadar ka Landa near Karachi, *Stocks*, 467!; Karachi, in stony ground very common, *Stocks*, 64!—DISTRIB. Beluchistan, Persia.

The follicles are eaten raw in Sind.

7. CALOTROPIS, R. Br.

Large erect shrubs or small trees. Leaves opposite, broad, subsessile. Flowers of medium size, in umbellate or subracemose lateral pedunculate cymes. Calyx of 5 distinct sepals, glandular inside, broadly ovate. Corolla broadly campanulate or subrotate, divided more than ½-way down; lobes broad, naked, valvate; corona of 5 fleshy laterally compressed lobes, adnate to and standing out as wide buttresses from the staminal-column with an upcurved and involute spur at the base and bifid at, or with 2 obtuse auricles a little below, the apex. Anthers short and broad, with short broad membranous appendages inflexed over the depressed pentagonal summit of the style-apex; pollen-masses solitary in each anther-cell, pendulous, attached to the pollen-carriers by short slender caudicles. Follicles short, thick, not echinate. Seeds comose. —DISTRIB. Species 4, of which 3 are confined to India, S. China, and the Malay Archipelago, the other extending into Africa.

Corona-lobes narrow, shorter than the staminal-column, with 2 obtuse auricles just below the entire apex..... 1. *C. gigantea.*
Corona-lobes broad, equalling or longer than the staminal-column, without auricles below the bifid apex..... 2. *C. procera.*

1. **Calotropis gigantea,** *R. Br. in Ait. Hort. Kew.* ed. 2, v. 2 (1811) p. 78. A tall shrub reaching 8–10 ft. high; bark yellowish-white, furrowed; branches stout, terete, more or less covered (especially the younger ones) with fine appressed cottony pubescence. Leaves 4–8 by 1½–4 in., sessile or nearly so, elliptic-oblong or obovate-oblong, acute, thick, glaucous-green, clothed beneath and more or less above with fine cottony tomentum; base narrow, cordate, sometimes amplexicaul. Flowers inodorous, purplish or white, 1½–2 in. in diam., in umbellate lateral cymes; peduncles from between the petioles, 2–3½ in. long, dilated at the base; pedicels much longer than the flowers, covered with cottony wool; buds ovoid. Calyx divided to the base; sepals ¼ by ⅛ in., ovate, acute, cottony. Corolla ¾ in. long or more; lobes ½–⅝ in. long, deltoid-ovate, subacute, revolute and twisted in age; lobes of the corona ½ in. long by ⅕ in. broad in the middle, shorter than the column, the back much curved towards the column above the obtuse spur, pubescent on the slightly thickened margin, the apex rounded (not bifid) with 2 obtuse auricles just below it. Follicles 3½–4 in. long, broad, thick, fleshy, ventricose, green. Seeds numerous, ¼ by ⅕ in., broadly ovate, flattened, narrowly margined, minutely tomentose, brown; coma 1–1¼ in. long. Fl. B. I. v. 4, p. 17; Grah. Cat. p. 120; Dalz. & Gibs. p. 149; Wight, Ill. tt. 155, 156 A; Trim. Fl. Ceyl. v. 3, p. 148; Talb. Trees, Bomb. ed. 2, p. 234; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prod. v. 2, p. 34.—Flowers: Feb.–July. VERN. *A'k*; *Mádár*; *Rui.*

Throughout the Presidency, a common weed in waste places. KONKAN: *Dalzell & Gibson.* DECCAN: *J. G. Woodrow!* S. M. COUNTRY: Belgaum district, *Talbot,* KANARA: Kála naddi, *Ritchie,* 424! GUJARAT: *Woodrow.*—DISTRIB. Throughout India; Ceylon, Malay Islands, S. China.

All parts of the plant are useful. The stems yield a valuable fibre which is however difficult to extract, though experiments have often been made with this object. The floss from the seeds is soft and very white and is employed for stuffing pillows. The milky sap furnishes a kind of guttapercha, and is used as well as the root-bark medicinally. The wood has been used for gunpowder-charcoal. See Watt, Dict. Econ. Prod. l. c.

2. **Calotropis procera,** *R. Br. in Ait. Hort. Kew.* ed. 2, v. 2 (1811) p. 78. An erect shrub usually 6–8 ft. high (sometimes growing much higher in arid places); young parts clothed with white cottony tomentum; bark soft, corky, spongy. Leaves subsessile, usually 2¼–6 by 1¾–3¼ (exceptionally 9 by 6 in.), broadly ovate, ovate-oblong, elliptic or obovate, with a short abrupt acumination, cottony-pubescent when young, at length glabrous. Flowers in umbellate cymes which are at first tomentose, but becoming nearly glabrous; peduncles 1–3 in. long, lateral; pedicels ¼ in. long; buds globose. Calyx divided to the base, glabrous; sepals ⅕ by $\frac{1}{10}$ in., ovate, acute. Corolla glabrous, about 1 in. across, divided about ⅔ of the way down; lobes usually erect, ovate, acute, ⅜ in. long; lobes of the corona ¼ by ⅙–⅕ in., compressed, equalling or exceeding the staminal-column, the back nearly straight or sometimes slightly curved away from the column above the upcurved subacute spur, usually glabrous but sometimes slightly scabrous-pubescent along the outer margin, the apex obliquely truncate, bifid and without auricles. Follicles 3–4 by 2–3 in., subglobose, ellipsoid or ovoid. Seeds ¼ by ⅛ in., broadly ovate, acute, flattened, narrowly margined, minutely tomentose, light-brown; coma 1¼ in. long. Fl. B. I. v. 4, p. 18; Dalz. & Gibs. p. 149; Wight, Icon. t. 1278; Talb. Trees, Bomb. ed. 2, p. 234; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prod. v. 2, p. 49.—Flowers: Dec. VERN. *A'k*; *Rui.*

Pretty common in dry parts of the Presidency, abundant in Sind. DECCAN: Poona, *Cooke*!, *Woodrow*; Jejuri, *Ranade*! SIND: *Cooke*!, *Stocks*, 423!—DISTRIB. More or less in warm dry places throughout India; Ava, Persia, Tropical Africa.

Very similar to the last species, from which it differs in the smaller flowers, but more especially in the corona. Mr. Talbot (Trees, Bomb. l. c.) aptly likens the shape of the corona-lobes of *C. gigantea* to that of the mythological dolphin, that of the corona of *C. procera* to the prow of a steamer.

This plant is used for the same purposes as the former, and it has been proposed to grow it in Sind, where it flourishes, as a fibre plant, but the quantity of fibre obtained from a stem is so small and the difficulty of separation hitherto has been so great, that this has not been attempted. Watt's Dictionary of Economic Products contains much valuable information on the subject.

8. **OXYSTELMA,** R. Br.

Twining glabrous shrubs or undershrubs. Leaves opposite. Flowers large and handsome, in lax racemose or subumbellate cymes or solitary; pedicels filiform. Calyx small, 5-partite, glandular inside. Corolla with a very short tube with a densely pubescent ring at its mouth (sometimes described as a corolline corona) within, and a broad saucer-shaped limb 5-lobed ½-way down; lobes deltoid, acute, valvate at the base, the tips overlapping to the right in bud; corona of 5 erect ovate or lanceolate acute lobes with 2 keels inside arising from the staminal-column. Stamens inserted at the base of the corolla-tube; filaments short, connate; anthers erect, terminated by a short inflexed membranous appendage; pollen-masses pendulous, waxy, elongate-clavate, compressed, attached in pairs by their attenuated ends to the short ovoid pollen-carriers. Style-apex truncate or convex, not exserted beyond the anthers. Follicles often solitary, oblong and obtuse or lanceolate and acute. Seeds comose.—DISTRIB. Tropical Asia and Africa; species 3 or 4.

1. **Oxystelma esculentum,** *R. Br. in Mem. Wern. Soc.* v. 1 (1811) p. 40. A perennial twining herb with milky juice; roots fibrous from

the lower nodes; stems numerous, long, much-branched, slender, glabrous. Leaves deciduous, 1¾–3½ by ⅛–⅓ in., linear or linear-lanceolate, acute, thin, pale-green, glabrous, base acute or rounded; petioles ⅛–½ in long, very slender. Flowers large, strikingly handsome, drooping, in peduncular lateral subumbellate or racemose few (usually 2–4) -flowered cymes longer than the leaves; peduncles long, sometimes reaching 1½ in. or more, slender; pedicels ½–¾ in. long, filiform, thickened upwards. Calyx glabrous, divided nearly to the base; segments 5, oblong-lanceolate, acute, ⅛ in. long, glandular inside. Corolla pale rose-colored or nearly white, glabrous, more than 1 in. across when expanded, saucer-shaped; tube scarcely any, the mouth with a densely pubescent ring; limb ¾ in. long; lobes ⅜ in. long, deltoid, acute, conspicuously ciliate, veined with purple; corona staminal, the lobes ⅛ in. long, ovate-lanceolate, acuminate, with incurved entire subulate tips. Anthers with inflexed membranous deltoid tips; pollen-masses 1 in each cell, pendulous. Style-apex slightly convex. Follicles 1½–2½ in. long, ovoid-lanceolate, tapering to a point, glabrous. Seeds very numerous, ⅛ in. long, broadly ovate, flat, the margins thin, often minutely and obscurely denticulate near the base, black; coma ¾ in. long. Fl. B. I. v. 4, p. 17; Grah. Cat. p. 121; Dalz. & Gibs. p. 150; Wight, Contrib. p. 54; Trim. Fl. Ceyl. v. 3, p. 147; Aitch. Pb. & Sind Pl. p. 91; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166; Watt, Dict. Econ. Prod. v. 5, p. 675. *Periploca esculenta*, Linn. f. Suppl. p. 168; Roxb. Cor. Pl. v. 1, p. 13, t. 11.—Flowers: Dec. VERN. *Dudhâni.*

KONKAN: *Law!* DECCAN: Poona, on the river bank near the Sangam, *Cooke!*, *Woodrow!* S. M. COUNTRY: Belgaum, *Ritchie*, 429! KANARA: *Law!* SIND: *Stocks*, 543!, *Cooke!*, *Bhola Puran!*—DISTRIB. Throughout the plains and lower hills of India, usually near water; Ceylon, Java.

The fruit is said to be eaten in Sind, where the plant is plentiful. The milky juice and the roots are used medicinally. See Watt, Dict. Econ. Prod. l. c.

VAR. *Wallichii.* Follicles short, 1½ by 1 in., oblong, rounded at both ends. *Oxystelma Wallichii* (sp.), Wight, Contrib. (1834) p. 54; DC. Prodr. v. 8 (1844) p. 543.

Note.—The follicles of the variety *Wallichii* differ very much from those of the specimen of *Oxystelma esculentum* in the British Museum collected by König on the Coromandel coast in 1774, and which is regarded as R. Brown's type of the genus *Oxystelma* and of the species *esculentum*. The follicles of that specimen are ovoid-lanceolate, 2½ by ½ in., tapering to a point, while the follicles of Wight's *O. Wallichii* are broad, oblong, very blunt and rounded at both ends, 1½ by 1 in. The description of the follicles of *Periploca esculenta*, Linn. f. (Suppl. p. 168), is meagre and indefinite. They are described as glabrous, oblong, inflated, a description which does not suit the follicles of König's specimen, which was apparently Linnæus's type. There are no follicles with Linnæus's specimens in Linnæus's Herbarium, nor are there any follicles with Roxburgh's Coromandel specimens. R. Brown follows Linnæus f. in describing the follicles. Roxburgh, whom R. Brown cites, gives an excellent figure (Cor. Pl. v. 1, p. 13, t. 11), but does not show the follicles, which he follows Linnæus f. in describing as oblong, inflated. Wight (Contrib. p. 54) assumes that Linnæus and R. Brown meant the plant with tapering follicles, but as far as the description goes, Linnæus may just as well have intended *O. Wallichii*. Mr. N. E. Brown, in Dyer, Fl. Trop. Afr. v. 4, p. 382, apparently takes this latter view and considers the typical *O. esculentum* to be the plant with rounded and obtuse follicles. I have followed Wight as an undeniable authority on the question, which cannot, it seems to me, be ever satisfactorily settled.

9. **PENTATROPIS,** R. Br.

Slender twining herbs or undershrubs. Leaves opposite, petiolate. Flowers small, in lateral umbellate cymes. Calyx 5-partite. Corolla divided nearly to the base; lobes 5, elongate, suberect, overlapping to the right, twisted to the left; corona simple, of 5 laterally compressed lobes adnate for ½ to ⅔ of their length to the backs of the anthers. Staminal-column arising from the base of the corolla; filaments connate; anthers with membranous appendages inflexed over the truncate apex of the style; pollen-masses pendulous, 1 in each anther-cell, attached by short slender caudicles to the pollen-carriers, not compressed, waxy. Follicles lanceolate, narrowed into a beak, small, glabrous. Seeds comose. —Distrib. Tropical Asia, Africa, and Australia; species about 6.

Corolla-lobes with long linear tails ..... 1. *P. cynanchoides.*
Corolla-lobes lanceolate-deltoid (not tailed) ..... 2. *P. microphylla.*

1. **Pentatropis cynanchoides,** *R. Br. in Salt, Voy. Abyss.* (1814) Append. p. 64. Shrubby, glabrous or nearly so; stems twining, slender. Leaves ¾–1½ in. long, very variable in breadth (¼–¾ in.), ovate or oblong or elliptic or linear, acute or obtuse, usually mucronate, more or less fleshy, glabrous; petioles 1/10–⅓ in. long, slender. Flowers greenish, in lateral umbellate 3–6-flowered cymes; peduncles from between the petioles, slender, rarely reaching ¼ in. long, sometimes almost 0; pedicels ¼–½ in. long, filiform; buds acuminate. Calyx deeply divided, slightly pubescent; segments 1/20–1/16 in. long, ovate, acuminate. Corolla divided almost to the base; lobes ⅓–½ in. long, narrowly linear from a triangular base which is about ⅛ in. broad, glabrous outside, minutely puberulous inside, the apex often curled; corona-lobes 1/10 in. long, arising a little above the base of the staminal-column, slightly shorter than the column, deltoid-ovate, with subtruncate base and acute or acuminate apex, compressed, adnate to the column for ⅔ of its length. Follicles 2–3 by ⅓ in., lanceolate, tapering into a beak, smooth, glabrous. Seeds ⅛ in. long, ovate, flattened, minutely and irregularly crenate at the lower end; coma ¾–1 in. long. N. E. Brown, in Dyer, Flor. Trop. Afr. v. 4, p. 380. *Pentatropis spiralis,* Decaisne, in Ann. Sc. Nat. sér. 2, v. 9 (1838) p. 327; Hook. f. Fl. B. I. v. 4, p. 19; Aitch. Pb. & Sind Pl. p. 90; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 6, part 1, p. 132.—Flowers: Feb. Vern. *Ambarvel.*

In the Bombay Presidency confined to Sind. Sind: *Stocks!, Dalzell!, Bhola Puran!*; Tata, *Cooke!*; Jemadar ka Landa near Karachi, *Stocks,* 429!; near Karachi, *Vicary!*—Distrib. India (Panjáb and eastwards to the Jumna river); Afghanistan, Beluchistan, Arabia, Tropical Africa.

2. **Pentatropis microphylla,** *Wight & Arn. in Wight, Contrib.* p. 52. A twining glabrous perennial herb, often slightly woody at the base; stems very slender. Leaves ½–1 by ⅜–¾ in., broadly oblong or ovate-elliptic, obtuse, mucronate, base rounded or cordate; petioles ⅛–¼ in. long. Flowers in lateral few-flowered cymes; peduncles ⅛–1/10 in. long or less; pedicels filiform, ½ in. long; buds subglobose. Calyx deeply divided; segments 1/16 in. long, lanceolate, acute. Corolla divided almost to the base; lobes ⅛ in. long, lanceolate-deltoid, acute, 1/10 in. broad at the base, spreading or reflexed; corona-lobes 1/12 in. long, triangular, about equalling the column or a little shorter than it, acute

at the apex, curving outwards to an acute base. Follicles 1½–2½ in. long, tapering to a long point, glabrous, the valves much everted after dehiscence. Seeds ¼ by ⅛ in., ovate, narrowly margined, truncate at the apex, slightly crenulate at the base; coma ½–¾ in. long. Fl. B. I. v. 4, p. 20; Grah. Cat. p. 120; Dalz. & Gibs. p. 149; Wight, Icon. t. 352; Trim. Fl. Ceyl. v. 3, p. 149; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 6, part 1, p. 131.—Flowers: Oct.–Dec. VERN. *Parparam.*

Tolerably common throughout the Presidency. KONKAN: Salsette, *Graham, Dalzell & Gibson*; Malabar hill (Bombay), *Graham.* DECCAN: *Dalzell & Gibson*; Bijapur, *Bhiva!*, *Woodrow!*; Gokak, *Bhiva!* GUJARAT: *Dalzell & Gibson*; Dangs, *Bhiva!* —DISTRIB. India (Bengal, Pegu, W. Peninsula); Ceylon.

10. **DÆMIA,** R. Br.

Twining pubescent or tomentose perennial herbs or undershrubs. Leaves opposite, cordate. Flowers medium-sized, in lateral racemose or corymbose pedunculate cymes. Calyx 5-partite, glandular inside. Corolla yellowish- or greenish-white; tube short, campanulate or cylindric; lobes 5, ovate, spreading, overlapping to the right in bud; corona double, the outer at the base of the staminal-column, membranous, annular, shortly 5-lobed, the lobes subquadrate or oblong, obtuse, truncate or denticulate, the inner corona of 5 erect fleshy lobes spurred at the base, adnate to the staminal-column up to the anthers, free above and produced into subulate horns incurved over the style-apex. Staminal-column arising at the mouth of the corolla-tube; anthers erect, with a membranous inflexed appendage. Style-apex exserted; pollen-masses waxy, 1 in each anther-cell, compressed, attached in pairs to the pollen-carriers by their attenuated ends without caudicles. Follicles lanceolate, usually echinate. Seeds comose.—DISTRIB. Tropical Africa, Tropical and Subtropical Asia; species 6.

1. **Dæmia extensa,** *R. Br. in Mem. Wern. Soc.* v. 1 (1811) p. 50. A perennial twining herb, fœtid when bruised and with much milky juice; stems clothed with spreading hairs. Leaves thin, 2–4 by 1½–3½ in., broadly ovate or suborbicular, acuminate, glabrous or more or less shortly pubescent above, usually velvety-pubescent beneath, the margins ciliate, base deeply cordate, the basal lobes semiorbicular; petioles ¾–2½ in. long, pubescent. Flowers greenish-yellow or dull white, in lateral cymes which are at first corymbose, afterwards racemose; peduncles pubescent, coming off from between the petioles, though not quite midway between them, 3–6 in. long or longer; pedicels capillary, ¾–1¼ in. long, pubescent; bracts minute, lanceolate, acute. Calyx pubescent, divided to the base; sepals ⅛ in. long, ovate-lanceolate, acute, ciliate. Corolla-tube narrowly campanulate, ⅛ in. long; lobes spreading, ¼ in. long, ovate-oblong, acute, ciliate; outer corona membranous, subquadrate, truncate; inner corona-lobes ⅕–⅓ in. long, including the subulate horns which are curved high over the staminal-column, spur acute. Follicles reflexed, 2–3 by ½ in., lanceolate, attenuated into a long beak, echinate with soft spines. Seeds ⅓ by ⅙ in., ovate, truncate at the apex, densely velvety-pubescent on both sides, narrowly margined, crenate at the rounded base; coma 1–1¼ in. long. Fl. B. I. v. 4, p. 20; Grah. Cat. p. 122; Dalz. & Gibs. p. 150; Wight, Icon. t. 596; Trim.

Fl. Ceyl. v. 3, p. 150; Talb. Trees, Bomb. ed. 2, p. 234; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 3, p. 3.—Flowers: Aug.–Jan. VERN. *Utarni.*

A common weed. KONKAN: N. Konkan, *Dalzell & Gibson*; common on the bushes among rocks on Malabar hill, Bombay, *Graham.* DECCAN: Poona, *Raoji*!, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 1853!; Badami, *Bhiva*! GUJARAT: *Dalzell & Gibson.* SIND: Tata district, *Bhola Puran*!—DISTRIB. Throughout India in the hotter parts; Ceylon, Afghanistan.

The stems yield a fine fibre which does not, however, seem to be of commercial importance. The plant has emetic and expectorant properties, and a decoction of the leaves is employed in some infantile complaints. See Watt, Dict. Econ. Prod. l. c.

11. HOLOSTEMMA, R. Br.

Twining glabrous shrubs. Leaves opposite, cordate. Flowers large, purple within, in sublateral lax few-flowered pedunculate cymes. Calyx 5-partite, not glandular inside; segments ovate. Corolla thick, subrotate, deeply 5-fid; lobes overlapping to the right; corona arising from the base of the staminal-column and adnate thereto, annular, fleshy, truncate. Staminal-column arising from the base of the corolla; filaments connate; anther-wings large, decurrent to the base of the column; pollen-masses 1 in each cell, elongate, compressed, pendulous by a long caudicle from an attenuated apex. Style-apex scarcely umbonate. Follicles slender, cylindric, slightly tapering.—DISTRIB. East Indies; species 1.

1. **Holostemma Rheedianum,** *Spreng. Syst.* v. 1 (1825) p. 851. A large glabrous twining shrub; stems much-branched, glabrous, shining. Leaves 3–5 by 2–3 in., thick, ovate-oblong, acuminate, glabrous above, more or less pubescent (especially on the nerves) and reticulately veined beneath, base deeply cordate, with rounded lobes, often with a few small glands at the base of the midrib above; petioles 1–2 in. long, stout, glabrous. Flowers fragrant, edible, purplish-crimson inside, frosted-white or pale-pink outside, in sublateral few-flowered cymes; peduncles 1–2 in. long, arising close to the base of the petiole outside the leaf-axil; pedicels as long as the peduncles. Calyx divided nearly to the base; segments $\frac{1}{5}$ in. long, broadly ovate, obtuse, veined. Corolla subrotate, divided about $\frac{2}{3}$ of the way down; lobes $\frac{1}{2}$ by $\frac{3}{8}$ in., ovate-oblong, obtuse, overlapping to the right; corona arising from the base of the staminal-column, consisting of a fleshy truncate ring $\frac{1}{10}$ in. high. Anthers large, with large stiff wings and with membranous tips inflexed over the column; pollen-masses $\frac{1}{16}$ in. long, waxy, compressed, linear-clavate, slightly curved, pendulous from the linear pollen-carriers by black caudicles $\frac{1}{20}$ in. long. Follicles 4–5 by $\frac{1}{4}$ in., linear-oblong, cylindric, slightly tapering to a blunt point. Seeds $\frac{1}{4}$ in. long, oblong, very thin, much flattened, somewhat truncate and not crenate at the base; coma $\frac{3}{4}$–1 in. long. *Holostemma Rheedei,* Wall. Cat. (1828) 4469; Hook. f. Fl. B. I. v. 4, p. 21; Grah. Cat. p. 121; Dalz. & Gibs. p. 148; Wight, Icon. t. 597 (the corona shewn incorrectly arising from the corolla); Trim. Fl. Ceyl. v. 3, p. 150; Talb. Trees, Bomb. ed. 2, p. 235; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 4, p. 261.—Flowers: July–Aug. VERN. *Tultuli*; *Shidodi.*

KONKAN: *Stocks*!, *Law*!; common in hedges about Bombay, *Dalzell & Gibson*;

Neral (below Matheran), *Bhiva*!; Salsette, *Graham*. DECCAN: Kothrud near Poona, *Kanitkar*!; Bowdhan near Poona, *Cooke*!—DISTRIB. India (Tropical Himalaya; Pegu, Birma, W. Peninsula); Ceylon.

The root is used in medicine, and the flowers are eaten.

12. **CYNANCHUM**, Linn.

Herbs or shrubs, erect or twining. Leaves opposite. Flowers small, in sessile or pedunculate corymbose or umbellate cymes or racemes, which are lateral or subaxillary. Calyx 5-partite. Corolla rotate or campanulate, 5-partite; lobes overlapping to the right or valvate; corona often membranous, arising from the staminal-column near or at its base, annular, cupular or tubular, toothed or lobed at the top or divided more or less deeply into 5 entire or toothed lobes. Staminal-column arising at or near the base of the corolla; anthers with a membranous tip; pollen-masses 1 in each cell, pendulous, attached by a short or long caudicle to the pollen-carriers. Style-apex truncate, conical or rostrate. Follicles smooth, winged or entire.—DISTRIB. Cosmopolitan; species about 100.

Leaves glaucous beneath; follicles winged..... 1. *C. Callialata.*
Leaves not glaucous beneath; follicles not winged ..... 2. *C. pauciflorum.*

1. **Cynanchum Callialata,** *Ham. in Wight, Contrib.* (1834) p. 56. A large twiner, glabrous or nearly so; stems slender, terete, glabrous or slightly hairy. Leaves 2–4 in. long, very variable ($\frac{3}{8}$–2 in.) in breadth, linear-oblong or ovate or elliptic-oblong, acuminate, usually glabrous on both surfaces, glaucous beneath, contracted and cordate at the base, the basal lobes small, rounded; petioles $\frac{1}{2}$–1 in. long, often with a stalked stipule-like rounded leaf in each axil. Flowers in lateral or subaxillary umbellate glabrous cymes; peduncles $\frac{1}{5}$–$\frac{1}{3}$ in. long, usually arising just outside the petiole; pedicels $\frac{1}{8}$–$\frac{1}{4}$ in. long. Calyx glabrous, divided to the base or nearly so; segments $\frac{1}{16}$–$\frac{1}{10}$ in. long, lanceolate, acute, not ciliate. Corolla $\frac{1}{5}$–$\frac{1}{4}$ in. long, divided nearly to the base, glabrous; lobes lanceolate-oblong, subacute; corona shorter than the corolla, tubular, plicate, membranous, with 5 obtuse lobes which are bifid or toothed (rarely entire) at the apex and with shorter lobes between them. Anther-tips membranous, orbicular, often crenulate on the margins, shortly stalked; pollen-masses oblong, attached to the pollen-carriers by distinct caudicles. Style-apex conical, subacute or obtuse or slightly lobulate, scarcely exserted. Follicles $2\frac{1}{2}$–3 in. long, lanceolate, 2-winged, glabrous. Seeds $\frac{1}{3}$ by $\frac{1}{5}$ in., broadly ovate, margined, not crenate at the base, glabrous, brown. Fl. B. I. v. 4, p. 24; Wight, Icon. t. 1279; Talb. Trees, Bomb. ed. 2, p. 235; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167.—Flowers: Oct.–Jan.

KONKAN: *Stocks*! DECCAN: Karléiz Ghát near Poona, *Bhiva*!; Bhor Ghát, *Cooke*!; Haveri, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 1111! KANARA: common in the evergreen forests near the Nilkund Ghát of N. Kanara, *Talbot*.—DISTRIB. India (Behar, Birma, W. Peninsula).

2. **Cynanchum pauciflorum,** *R. Br. in Mem. Wern. Soc.* v. 1 (1811) p. 45. Herbaceous twiner, glabrous or nearly so; stems with long internodes, slender, terete, glabrous. Leaves 2–3 by 1–$1\frac{3}{4}$ in., ovate or ovate-oblong or subhastate, acute or acuminate, thin, glabrous, base broadly cordate, the basal lobes rounded; petioles $\frac{3}{4}$–$1\frac{1}{4}$ in. long,

usually with a rounded stipule-like leaf in the axil of each. Flowers in umbellate pedunculate glabrous cymes; peduncles $\frac{1}{8}$–$\frac{1}{3}$ in. long, arising from between the petioles; pedicels $\frac{1}{10}$–$\frac{1}{4}$ in. long. Calyx divided to the base; sepals $\frac{1}{10}$ in. long, lanceolate, acute, ciliate. Corolla divided almost to the base; lobes $\frac{1}{6}$ in. long, oblong, subacute; corona arising from the very base of the staminal-column, about as long as the corolla, tubular, plicate, membranous, with 5 distant linear-lanceolate lobes about $\frac{1}{12}$ in. long on the margin and small teeth between the lobes. Staminal-column arising from the base of the corolla; pollen-masses small, oblong, attached to the pollen-carriers by distinct caudicles. Style-apex rounded, a little exserted beyond the membranous anther-tips. Follicles 2–2½ in. long, lanceolate. Seeds $\frac{1}{4}$ by $\frac{1}{6}$ in., broadly ovate, flattened, margined, glabrous, brown; coma 1–1¼ in. long. Fl. B. I. v. 4, p. 23; Grah. Cat. p. 121; Dalz. & Gibs. p. 148; Trim. Fl. Ceyl. v. 3, p. 151; Talb. Trees, Bomb. ed. 2, p. 235; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 2, p. 678.—Flowers: Oct.–Feb.

DECCAN: Junnar, *Woodrow*; Musi near Poona, *Dalzell & Gibson*. S. M. COUNTRY: about Dharwar, *Law* ex *Graham*; Belgaum, *Ritchie*!; Castlerock, *Cooke*!—DISTRIB. India (W. Peninsula); Ceylon.

13. **SARCOSTEMMA,** R. Br.

Leafless trailing or twining jointed shrubs with pendulous branches. Flowers small, in sessile umbels which are terminal or lateral from the nodes. Calyx 5-partite. Corolla rotate or subcampanulate, deeply divided; lobes 5, overlapping to the right in bud; corona double, arising from the staminal-column, the outer annular or cup-shaped, often pentagonal, truncate or shortly lobed, the inner corona of 5 erect fleshy compressed or keeled lobes with their basal part embraced by the outer corona. Staminal-column arising from the base of the corolla; anthers with membranous inflexed or suberect appendages; pollen-masses pendulous, 1 in each cell, attached in pairs by short or long slender caudicles to the pollen-carriers. Style-apex shortly conical or oblong-fusiform, included or exserted. Follicles smooth. Seeds comose.—DISTRIB. Tropical Asia, Africa, and Australia; species 5 or 6.

Umbels terminal; style-apex short, conical, not exserted.	
Follicles tapering to both ends, slightly divergent	1. *S. brevistigma.*
Follicles straight, rod-like, not tapering towards the base and but little towards the apex, much divaricate	2. *S. Stocksii.*
Umbels terminal and lateral; style-apex oblong, fusiform, much exserted	3. *S. intermedium.*

1. **Sarcostemma brevistigma,** *Wight, Contrib.* (1834) p. 59. Stems $\frac{1}{8}$–$\frac{1}{4}$ in. in diam., green, glabrous; joints 4–8 in. long. Flowers in sessile many-flowered terminal umbels; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long, slender, pubescent; bracts minute, lanceolate. Calyx divided to the base or nearly so, with glands inside; segments $\frac{1}{20}$ in. long, ovate-oblong, subacute, with membranous margins. Corolla campanulate, pale greenish-white, divided nearly to the base; lobes $\frac{1}{5}$ in. long, ovate-oblong, subacute; outer corona crenately 10-lobed on the margin; lobes of the inner corona thick, fleshy, obtuse, longer than the staminal-column, almost concealing the anthers. Staminal-column very short; pollen-masses waxy, compressed, clavate, slightly curved, attached by a very

short caudicle to the pollen-carriers. Style-apex very shortly conical or blunt. Follicles 4–5 by $\frac{1}{3}$ in., lanceolate, tapering to both ends, straight, slightly diverging when two together. Seeds $\frac{1}{5}$ by $\frac{1}{8}$ in., ovate, flattened, coma $\frac{3}{4}$ in. long. Fl. B. I. v. 4, p. 26; Dalz. & Gibs. p. 149; Wight, Icon. t. 595; Talb. Trees, Bomb. ed. 2, p. 235; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 6, part 2, p. 477.—Flowers: June–July. VERN. *Soma.*

KONKAN: *Stocks!* DECCAN: in stony places, *Dalzell*, *Talbot*; Poona, *Cooke!*, *Woodrow!* S. M. COUNTRY: Belgaum, *Ritchie*, 1864!—DISTRIB. India (Bengal, Birma, W. Peninsula).

The stems of this plant as well as those of *Sarcostemma intermedium* are used by cultivators to extirpate white ants from sugar-cane fields. A bundle of twigs is put into the trough from which the field is watered together with a bag of salt, and the water thus impregnated destroys the white ants without affecting the crop. The milky juice of the plant is drunk by native travellers. See Watt, Dict. Econ. Prod. l. c.

2. **Sarcostemma Stocksii,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 27. Stems $\frac{1}{8}$–$\frac{1}{4}$ in. in diam., green, glabrous. Flowers in terminal umbels exactly as in *Sarcostemma brevistigma*. Follicles $2\frac{1}{4}$–3 in. long, straight, cylindric, almost the same breadth throughout except towards the subacute apex, widely divaricate, so much so that both follicles are sometimes in one horizontal straight line. Seeds $\frac{1}{4}$ by $\frac{1}{10}$ in., narrowly oblong, truncate at the apex, somewhat attenuated towards the base; coma 1 in. long. Fl. B. I. v. 4, p. 27; Talb. Trees, Bomb. ed. 2, p. 236. *Sarcostemma brachystigma* (by error for *brevistigma*), Hook. Icon. t. 861 (*axillary* umbels of flowers incorrectly shewn).—Flowers: July–Sept. The only difference between this plant and *S. brevistigma* seems to be in the follicles.

S. M. COUNTRY: Gadag táluka of the Dharwar district, *Talbot.* SIND: *Stocks*, 509! —DISTRIB. Apparently endemic in the Bombay Presidency.

3. **Sarcostemma intermedium,** *Decaisne, in DC. Prodr.* v. 8 (1844) p. 538. Twining. Flowers in terminal and lateral sessile umbels. Calyx puberulous outside, divided to the base or nearly so; segments $\frac{1}{20}$ in. long, ovate-oblong, subacute. Corolla white, divided nearly to the base; lobes $\frac{1}{4}$ in. long, oblong, obtuse; outer corona with 10 obtuse lobes on the margin; lobes of the inner corona rather thin, not fleshy, oblong, subacute. Staminal-column elongate; pollen-masses waxy, clavate, compressed, attached by rather long caudicles to the pollen-carriers. Style-apex oblong-fusiform, much exserted beyond the anthers. Follicles 3–4 in. long, not narrowed at the base, narrowed towards the tip, not divaricate when two together. Seeds $\frac{1}{5}$–$\frac{1}{4}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., oblong, flattened, rounded at the base, truncate at the apex; coma $\frac{3}{4}$ in. long. Fl. B. I. v. 4, p. 27; Dalz. & Gibs. p. 149; Wight, Icon. t. 1281. *Sarcostemma viminale*, Wight, Contrib. p. 59 (*not* of R. Br.); Grah. Cat. p. 122.—Flowers: July–Sept.

KONKAN: *Stocks!* DECCAN: *Dalzell & Gibson*; Poona, *Woodrow!*; rocky hills about Loni, *Graham*; Kamatki and Kartriz Ghâts, *Graham.* GUJARAT: island of Perim at the mouth of the Narbada river, *Dr. Lush* ex *Graham.*—DISTRIB. India (W. Peninsula).

14. GYMNEMA, R. Br.

Twining shrubs. Leaves opposite. Flowers small, in crowded lateral umbellate cymes. Calyx 5-partite. Corolla subrotate, campanulate or

urceolate, divided to the middle or beyond it; lobes thick, overlapping to the right in bud; corona arising from and adnate to the corolla-tube, either of 5 fleshy lobes adnate up to the mouth of the corolla-tube with more or less incurved tips, or of 5 pairs of fleshy ridges on the lower part of the tube alternating with the corolla-lobes. Staminal-column arising from the base of the corolla; anthers short, erect, with short membranous appendages; pollen-masses erect, solitary in each anther-cell. Style-apex often exserted beyond the anthers. Follicles smooth. Seeds comose.—DISTRIB. Asia, Africa, and Australia; species about 20.

Ridges of the corona protruding beyond the mouth of the corolla	1. *G. sylvestre.*
Ridges of the corona not protruding beyond the mouth of corolla.	
Calyx-segments longer than the corolla-tube	2. *G. montanum.*
Calyx-segments shorter than the corolla-tube	3. *G. pergularioides.*

1. **Gymnema sylvestre,** *R. Br. in Mem. Wern. Soc.* v. 1 (1811) p. 33. A large woody much-branched climber running over the tops of high trees; young stems and branches pubescent, often densely so, terete. Leaves 1¼–2 by ½–1¼ in., ovate, elliptic, or ovate-lanceolate, acute or shortly acuminate, more or less pubescent on both sides, sometimes densely so beneath, especially on the nerves, base rounded or cordate, sometimes cuneate; petioles ¼–½ in. long, pubescent. Flowers in pedunculate or nearly sessile cymes; peduncles densely pubescent, shorter than the petioles and arising from between them, sometimes producing successive umbels or whorls of flowers; pedicels ⅛–½ in. long, pubescent; bracts minute, ovate-oblong, hairy, ciliate. Calyx pubescent, divided to the base or nearly so; segments 1/12 in. long, oblong, obtuse, ciliolate. Corolla yellow, ⅛–⅕ in. across; tube campanulate, 1/16 in. long, about equalling the lobes; lobes thick, ovate-deltoid, spreading, recurved, glabrous; corona of 5 processes inserted on the corolla-tube, alternate with its lobes, free at the short deltoid subacute tip which protrudes above the sinus, the lower adnate portion decurrent, channelled and with strongly ciliate margins. Style-apex thick, subhemispherical, much exserted beyond the anthers, pearly-white. Follicles 2½–3 by ⅓ in., terete, rigid, lanceolate, attenuated into a beak, glabrous, one follicle often suppressed. Seeds ½ in. long, narrowly ovoid-oblong, flat, with a thin broad marginal wing, brown, glabrous. Fl. B. I. v. 4, p. 29; Grah. Cat. p. 120; Dalz. & Gibs. p. 151; Wight, Icon. t. 349; Trim. Fl. Ceyl. v. 3, p. 153; Talb. Trees, Bomb. ed. 2, p. 236; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 4, p. 189.—Flowers: Apr.–May. VERN. *Kavali*; *Pitáni.*

KONKAN: *Stocks*!, *Law*!. DECCAN: Mahableshwar, very common, *Cooke*!, *Woodrow*! S. M. COUNTRY: hills near Bagalkot and Badami, *Law* ex *Graham*; Dharwar districts, common, *Talbot*; Belgaum Ghâts, *Ritchie*, 433! KANARA: near the coast at Karwar, *Talbot*; Sampkhand (N. Kanara), *Woodrow*.—DISTRIB. India (W. Peninsula, Banda); Ceylon, Tropical Africa.

The leaves of this plant if chewed possess the peculiar property of completely destroying the taste for saccharine substances, sugar feeling like sand in the mouth. The effect lasts for some hours. It is also said to neutralize the taste of bitters such as quinine, but I have not, in my own case, found this to be so. In Mahableshwar, where the plant is abundant, I have frequently tried the experiment.

2. **Gymnema montanum,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 31. A twining shrub glabrous or nearly so; branches slender, smooth. Leaves 3–4½ by 1¼–2 in., coriaceous, oblong or ovate-oblong or oblong-lanceolate, obtuse, acute or acuminate, glabrous; petioles ⅓–½ in. long, puberulous. Flowers greenish-yellow (*Dalz. & Gibs.*), in corymbose at length racemose cymes; peduncles shorter than the petioles, pubescent; pedicels ⅛–⅙ in. long, pubescent; bracts minute, oblong, obtuse, ciliate. Calyx divided to the base; sepals ⅕ in. long, linear-oblong, reflexed, ciliate. Corolla-tube ⅛ in. long, narrowly campanulate; lobes about equalling the tube, oblong, subacute; corona of 5 processes adnate to the corolla-tube and alternate with its lobes, the apices of the processes not prolonged above the sinus, the margins slightly thickened and densely villous. Staminal-column arising from the base of the corolla-tube; anther-tips acute; pollen-masses erect, clavate, compressed, waxy, attached by very short caudicles to the pollen-carriers. Follicles acuminate, 3 by ¼–⅓ in. (*Dalzell & Gibson*). Talb. Trees, Bomb. ed. 2, p. 236. *Bidaria elegans*, Dalz. & Gibs. p. 151. *Gymnema tingens*, var. *ovalifolia*, Wight, Icon. t. 592.

KONKAN: *Law!*, *Stocks!*, *Dalzell!*; from the Konkan southwards, *Talbot.*—DISTRIB. India (W. Peninsula).

3. **Gymnema pergularioides,** *Wight & Gard. in Thw. Enum.* (1860) p. 198. A twining shrub; branches long, slender, hairy. Leaves membranous, 1–5 by ⅜–2 in., elliptic or oblong-lanceolate, caudate-acuminate, glabrous or slightly pubescent on both sides, pale beneath, base rounded or acute; petioles ¼–½ in. long, slender. Flowers in umbellate globose cymes; peduncles as long as the petioles; pedicels short, pubescent. Calyx divided to the base or nearly so; segments $\frac{1}{16}$ in. long, elliptic-oblong, obtuse. Corolla-tube ⅛ in. long; lobes equalling the tube, oblong-lanceolate, subacute, spreading or recurved; corona of 5 hairy somewhat obscure ridges on the corolla-tube, their tops not reaching nearly to the sinus. Staminal-column arising from the base of the corolla-tube; anther-tips obtuse; pollen-masses erect, oblong, subsessile on the pollen-carriers. Style-apex exserted, conical, bifid. Follicles not divaricate, 4½–6 in. long, cylindric, tapering to a long beak, pubescent at first, at length glabrate. Fl. B. I. v. 4, p. 32; Trim. Fl. Ceyl. v. 3, p. 154; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167. —Flowers: Apr.

S. M. COUNTRY: Haveri, *Woodrow.*

Woodrow, in his list of Bombay plants (*l. c.*), gives this as occurring at Haveri in the Dharwar districts, but I have seen no specimens from the Bombay Presidency. Trimen says the plant is endemic in Ceylon, where it is however not common.

15. TYLOPHORA, R. Br.

Twining (rarely erect) perennials. Leaves opposite. Inflorescence lateral or axillary, usually consisting of slender simple or branched axes with several flower-clusters or short racemes scattered along them, or occasionally the flower-clusters are sessile at the nodes of the stem; flowers small. Calyx 5-partite. Corolla deeply 5-lobed, rotate or rotate-campanulate; lobes slightly overlapping to the right; corona of 5 small fleshy tubercles adnate to or radiate from the filament part of the staminal-column and arising from near its base. Staminal-column

arising from the base of the corolla; anthers erect, small, with a membranous appendage; pollen-masses very minute, erect, suberect or horizontal, attached by their middle or near their base to very slender caudicles, by which they are affixed in pairs to the pollen-carriers. Style-apex pentagonal or 5-lobed, depressed, flattened or convex, rarely exceeding the anthers. Follicles smooth, acuminate, sometimes winged. Seeds comose.—DISTRIB. Tropics of the Old World and Australia; species about 40.

Stem suberect, less than 20 in. long	1. *T. fasciculata.*
Stem and branches long, twining.	
Calyx glabrous	2. *T. tenuis.*
Calyx hirsute or pubescent.	
Corona wholly adnate to the staminal-column without free points above.	
Leaves obtuse; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long; corolla $\frac{1}{8}$ in. long.	3. *T. rotundifolia.*
Leaves acute or acuminate; petioles $\frac{1}{2}$ in. long; corolla $\frac{1}{8}$ in. long	4. *T. Dalzellii.*
Corona-apex free, the point reaching as high as the style-apex	5. *T. asthmatica.*

1. **Tylophora fasciculata,** *Ham. in Wight, Contrib.* (1834) p. 50. Stems several from the root, 12–18 in. long, erect, flexuous or slightly twining amongst grass, pubescent. Leaves approximate, diminishing in size upwards, coriaceous, 1–2 by $\frac{1}{2}$–$1\frac{1}{4}$ in., ovate or lanceolate, acute, glabrous above, more or less pubescent on the nerves beneath, base acute or rounded; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers in lateral peduncled umbellate or racemose cymes; peduncles arising from between the petioles; pedicels filiform, $\frac{1}{2}$ in. long, pubescent; bracts lanceolate. Calyx divided almost to the base; segments $\frac{1}{12}$ in. long, lanceolate, acute. Corolla $\frac{1}{8}$ in. long, deeply divided; lobes $\frac{1}{10}$ in. long, oblong-lanceolate, acute, veined; corona of 5 broadly ovoid fleshy lobes radiating from the staminal-column. Anther-appendages membranous, broad, projecting above the 5-lobed style-apex; pollen-masses minute, subtransverse. Follicles $1\frac{1}{2}$–2 by about $\frac{1}{2}$ in., fusiform, acute, striate, glabrous. Seeds $\frac{1}{4}$ in. long, broadly ovate, flat; coma $\frac{3}{4}$ in. long. Fl. B. I. v. 4, p. 40; Dalz. & Gibs. p. 151; Wight, Icon. t. 848; Trim. Fl. Ceyl. v. 3, p. 156; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 6, part 4, p. 206.—Flowers: July–Aug. VERN. *Bhindodi.*

KONKAN: *Law!, Dalzell & Gibson*; Wandra, side of Tansa canal, *Kanitkar*! S. M. COUNTRY: hills north of Belgaum, *Ritchie*, 1859!—DISTRIB. India (W. Peninsula, Nipal); Ceylon.

2. **Tylophora tenuis,** *Blume, Bijdr.* (1826) p. 1062. A slender twiner; stems much-branched, slender, tough, glabrous. Leaves variable, somewhat fleshy, $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{3}$–$\frac{3}{4}$ in. (on the main stem sometimes reaching 2 by 1 in.), ovate or elliptic or oblong, obtuse or acute, often apiculate, glabrous, base acute or rounded; petioles $\frac{1}{5}$–$\frac{1}{3}$ in. long. Flowers lurid-purple inside, in lateral paniculate glabrous cymes; peduncles from between the petioles, close to one of them; pedicels filiform; bracts lanceolate-subulate. Calyx divided nearly to the base, glabrous; segments $\frac{1}{25}$ in. long, lanceolate, acute. Corolla $\frac{1}{6}$ in. across; lobes $\frac{1}{16}$ in. long, ovate-oblong, subacute, glabrous, veined; corona of 5 small dark-colored tubercles adnate to the staminal-column. Pollen-masses sub-

erect, minute. Style-apex pentagonal, slightly convex. Follicles 2–3 in. long, lanceolate, tapering to both ends, finely pointed, finely striate, glabrous. Seeds $\frac{1}{3}$ in. long, ovate-oblong; coma $\frac{3}{4}$ in. long. Fl. B. I. v. 4, p. 42; Trim. Fl. Ceyl. v. 3, p. 158. *Tylophora carnosa*, Wall. in Wight, Contrib. p. 49; Wight, Icon. t. 351 (*not* of Dalz. & Gibs.). *T. tenuissima*, Wight & Arn. in Wight, Contrib. p. 49; Wight, Icon. t. 588; Dalz. & Gibs. p. 150.

This is given in Dalzell & Gibson's Bombay Flora (*l. c.*), but no locality has been assigned to it.

I have seen no specimens from the Bombay Presidency. There are none in Herb. Kew., and Woodrow does not include the plant in his list of Bombay plants.

3. **Tylophora rotundifolia,** *Ham. in Wight, Contrib.* (1834) p. 50. A twining perennial; stems shortly pubescent. Leaves $1\frac{1}{4}$–$2\frac{1}{2}$ by 1–2 in., coriaceous, broadly ovate, oblong or suborbicular, rounded and often mucronate at the apex, glabrous above, more or less pubescent beneath and with ciliolate margins, base subcordate, rounded or truncate; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long. Flowers in many-flowered umbellate cymes; peduncles from between the petioles, pubescent, shorter than the leaves (sometimes almost 0), bearing at the apex several filiform pubescent pedicels $\frac{1}{2}$–1 in. long; bracts long, lanceolate-subulate. Calyx hairy outside, divided nearly to the base; segments $\frac{1}{8}$ in. long, narrowly lanceolate, acute, ciliate. Corolla $\frac{1}{5}$ in. long, glabrous; lobes $\frac{1}{6}$ in. long, elliptic, obtuse, veined; corona of 5 fleshy rounded lobes wholly adnate to the staminal-column. Anther-appendages short, membranous; pollen-masses minute. Style-apex pentagonal, not exserted beyond the anther-tips. Follicles not seen. Fl. B. I. v. 4, p. 43; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167.

KONKAN: *Law!*, *Stocks!* S. M. COUNTRY: Londa, *Woodrow.*—DISTRIB. India (Oude, Assam, W. Peninsula).

4. **Tylophora Dalzellii,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 43. A twining perennial; stems slender, terete, glabrous or the young ones pubescent. Leaves 2–4½ by 1–2½ in., ovate-oblong, acute or acuminate, often mucronate, glabrous or nearly so, base rounded or cordate; petioles $\frac{1}{2}$ in. long. Flowers in sessile or pedunculate lateral cymes or with umbels or racemes at the flexures of a somewhat zigzag rhachis, which is hispid or with a number of linear-lanceolate bracts at the insertion of the pedicels; peduncles from between the petioles; pedicels $\frac{1}{4}$–1 in. long, filiform, glabrous. Calyx hispid outside, divided almost to the base; segments $\frac{1}{16}$ in. long, linear-lanceolate, acute. Corolla $\frac{1}{8}$ in. long; lobes $\frac{1}{10}$ in. long, elliptic-oblong, obtuse, veined; corona of 5 dark-colored processes, rounded at the base and sloping a little upward towards the top of the staminal-column, wholly adnate to the column; pollen-masses minute. Follicles 3–4 in. long, tapering to a fine point at the apex, scarcely tapering towards the base, finely striate, glabrous. Seeds $\frac{1}{3}$ in. long, ovate-oblong, flattened; coma $\frac{3}{4}$ in. long. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167. *Tylophora carnosa*, Dalz. & Gibs. p. 150 (*not* of Wight).—Flowers: Aug.

KONKAN: *Stocks!*, *Law!*; Vingorla, *Stocks!*, *Ritchie*, 1858!; W. Ghâts, *Kanitkar!* DECCAN: Mahableshwar, *Cooke!*—DISTRIB. India (W. Peninsula).

5. **Tylophora asthmatica,** *Wight & Arn. in Wight, Contrib.* (1834) p. 51. A twining perennial; roots many, long, fleshy; stems elongate, glabrous or pubescent, not much branched. Leaves 2–4 by 1–2¼ in., ovate or elliptic-oblong, acute or acuminate, often apiculate, glabrous or nearly so above, more or less pubescent (especially when young) beneath, base usually cordate; petioles ¼–½ in. long. Flowers large for the genus, in umbellate cymes; peduncles from between the petioles, shorter than the leaves, each bearing at its apex 2–3 nearly sessile umbels; pedicels filiform with a number of filiform hairy bracts at their base. Calyx coarsely hairy outside, divided almost to the base; segments $\frac{1}{10}$ in. long, lanceolate, very acute. Corolla greenish-yellow or greenish-purple, ⅕–¼ in. long; lobes ⅙ in. long, oblong, acute; corona gibbous below, abruptly narrowed at the apex to a free point which reaches nearly as high as the apex of the style. Pollen-masses minute, transverse, attached to the pollen-carriers by distinct caudicles. Style-apex not exserted beyond the anther-tips. Follicles 3–4 in. long, tapering to a fine point at the apex, scarcely tapering towards the base, finely striate, glabrous. Seeds ⅓ in. long, broadly ovate; coma ¾–1 in. long. Fl. B. I. v. 4, p. 44; Dalz. & Gibs. p. 150; Wight, Icon. t. 1277; Trim. Fl. Ceyl. v. 3, p. 158; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 6, part 4, p. 204.—Flowers: Aug.–Nov. VERN. *Antamul*; *Pitmári.*

KONKAN: Vingorla, *Stocks!* DECCAN: Lanoli, *Woodrow*; Gokak, *Woodrow.* KANARA: *Law!*; Kusardi, *Ritchie*, 1857!—DISTRIB. Throughout the plains of India; Ceylon, Siam, Malay Islands, Borneo.

The roots and leaves are used as a substitute for ipecacuanha, and were officinal in the Bengal Pharmacopœia of 1844. See Watt, Dict. Econ. Prod. l. c.

16. **PERGULARIA,** Linn.

Twining shrubs. Leaves opposite. Flowers of moderate size, in lateral umbellate cymes. Calyx 5-partite. Corolla hypocrateriform; tube inflated at the base; lobes 5, overlapping to the right; corona of 5 erect lobes arising from the base of the staminal-column and adnate to it in the lower part, free above and with a narrow or subulate process on the face. Staminal-column arising from the base of the corolla; anthers oblong, erect, with long membranous appendages conniving over the style-apex; pollen-masses 1 in each anther-cell, erect, attached in pairs to the pollen-carriers by very short caudicles. Style-apex not exserted beyond the anther-tips, stout, pentagonal-ovoid. Follicles lanceolate, terete, rather turgid. Seeds comose.—DISTRIB. Species about 10, Asiatic and African.

1. **Pergularia pallida,** *Wight & Arn. in Wight, Contrib.* (1834) p. 42. A large twining shrub; branches pale, slender, more or less pubescent. Leaves 2–4½ by 1½–3 in., ovate, acuminate, glabrous or slightly pubescent, pale and reticulately veined beneath; petioles ½–2 in. long, pubescent. Flowers not or scarcely fragrant, in umbellate lateral cymes; peduncles from between the petioles ¼–½ in. long, pubescent; pedicels ½ in. long, pubescent. Calyx pubescent outside, divided to the base; sepals ⅕ in. long, oblong, obtuse, ciliate. Corolla pale-yellow, ⅝ in. long, divided to below the middle; tube ¼ in. long, inflated at the base, glabrous inside except near the base where it is slightly hairy;

lobes $\frac{3}{8}$ in. long, linear, obtuse, overlapping to the right, glabrous; corona-lobes linear, with a long slightly bent beaked process projecting from the inner edge. Anther-appendages very long, membranous, subacute; pollen-masses $\frac{1}{10}$ in. long, oblong or slightly clavate, erect on short distinct caudicles. Style-apex not exserted, stout. Follicles $2\frac{1}{2}$–4 in. long, lanceolate, somewhat turgid, tapering to a blunt point, glabrous. Seeds $\frac{1}{3}$ by $\frac{1}{5}$ in., ovate, strongly margined, flattened, rounded at the base, truncate at the apex, pale brown, glabrous; coma 1 in. long. Fl. B. I. v. 4, p. 38; Wight, Icon. t. 585; Talb. Trees, Bomb. ed. 2, p. 237; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167.—Flowers: July–Aug.

Dalzell in Herb. Kew. without locality. DECCAN: *Talbot*. S. M. COUNTRY: stony hills near Dharwar, *Talbot*.—DISTRIB. India (Tropical Himalaya, Central India, Behar, Birma).

Pergularia minor, Andr. Bot. Rep. t. 184. A large climber, a native of the Himalayas, with ovate, cordate, acuminate leaves 3 in. long and umbellate cymes of greenish-yellow sweetly scented flowers. It is largely grown in gardens, and is much valued for its fragrant flowers, from which, according to Watt, an *attar* is extracted. Fl. B. I. v. 4, p. 38; Bot. Mag. t. 755; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 6, part 1, p. 139. *Pergularia odoratissima*, Wight, Contrib. p. 43 (*not* of Sm.); Grah. Cat. p. 120; Dalz. & Gibs. Suppl. p. 54; Woodr. Gard. in Ind. ed. 5, p. 383.—VERN. *Kunja-luta*.

17. **MARSDENIA**, R. Br.

Twining rarely erect shrubs. Leaves opposite. Flowers medium-sized or small, in umbellate cymes or in small sessile umbels or clusters scattered along the branches of the cymes or panicles which are lateral or axillary. Calyx 5-partite. Corolla subcampanulate; lobes 5, overlapping to the right; corona of 5 erect fleshy lobes arising from and with their basal portion adnate to the staminal-column, the apical portion free, applied to the backs of the anthers. Staminal-column arising from or near the base of the corolla; anthers erect, with membranous appendages more or less incumbent on the top of the style; pollen-masses erect, 1 in each anther-cell, attached in pairs to the pollen-carriers by short or long moderately stout caudicles. Style-apex depressed, convex, conical or produced into a beak. Follicles with a thick pericarp, smooth, sometimes winged. Seeds comose.—DISTRIB. Tropics of both hemispheres, 1 species in the Mediterranean region; species about 70.

I have followed Mr. N. E. Brown (Dyer, Fl. Trop. Afr. v. 4, p. 417) in including the genus *Dregea* in *Marsdenia*.

Corolla hairy outside; corona-lobes acute at top	1. *M. tenacissima*.
Corolla glabrous outside; corona-lobes rounded at top.	
Leaves broadly ovate	2. *M. volubilis*.
Leaves lanceolate	3. *M. lanceolata*.

1. **Marsdenia tenacissima**, *Wight & Arn. in Wight, Contrib.* (1834) p. 41. A large twining shrub, the old stems with grey corky bark; branchlets softly pubescent. Leaves 3–6 by $2\frac{1}{2}$–$4\frac{1}{2}$ in., broadly ovate, acuminate, hairy above, densely and softly tomentose beneath,

base cordate with a deep sinus and rounded lobes; petioles 2–3 in. long, softly pubescent. Flowers greenish-yellow, in dense much-branched compound pubescent cymes; peduncles arising from between the petioles, close to one of them; pedicels slender, rather longer than the flowers. Calyx hairy, divided nearly to the base; segments $\frac{1}{8}$ in. long, oblong-lanceolate, acute. Corolla hairy outside; tube $\frac{1}{8}$ in. long, slightly contracted at the mouth; lobes shorter than the tube, hairy outside, oblong, obtuse, spreading; corona-lobes very acute at tip, arching over the top of the style-apex. Staminal-column arising from the very base of the corolla-tube; anther-tips membranous, oblong, subobtuse, inflexed over the apex of the style; pollen-masses erect, oblong-clavate, attached to the pollen-carriers by very short caudicles. Style-apex large, conical, not exserted beyond the anther-tips. Follicles 3–6 in. long, ovoid-lanceolate, downy. Seeds flattened, ovate-oblong, $\frac{1}{2}$ in. long. Fl. B. I. v. 4, p. 35; Wight, Icon. t. 590; Trim. Fl. Ceyl. v. 3, p. 155; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 5, p. 188.

GUJARAT: Champanir, *Woodrow*.

This plant is included on the authority of Woodrow, who gives its habitat as above. I have not seen any specimens from the Bombay Presidency.—DISTRIB. India (E. and W. Himalayas, Rajmahal hills, Ava); Ceylon, Timor.

A milky juice exudes from incisions in the stem which thickens into a kind of caoutchouc and removes pencil-marks. The bark of the stems yields a very valuable fibre of great strength. See Watt, Dict. Econ. Prod. l. c.

2. **Marsdenia volubilis,** *T. Cooke.* A large twining shrub; older branches ash-colored, very long, glabrous, often with lenticels and sometimes with small black dots; young branches green, slender, smooth. Leaves $2\frac{1}{2}$–6 by $1\frac{3}{4}$–$4\frac{1}{2}$ in., broadly ovate or suborbicular, acuminate, glabrous or more or less softly pubescent, reticulately veined and with a few small glands just above the petiole, base rounded or cordate; petioles $\frac{1}{2}$–$1\frac{1}{4}$ in. long. Flowers numerous, green or yellowish-green, in lateral drooping umbellate cymes; peduncles arising from between the petioles, 1–2 in. long, slender, puberulous; pedicels $\frac{1}{4}$–1 in. long, very slender. Calyx divided nearly to the base; segments $\frac{1}{10}$ in. long, ovate-oblong, obtuse or subacute, ciliolate. Corolla $\frac{1}{4}$ in. long, deeply divided, glabrous outside; lobes $\frac{1}{5}$ in. long, broadly ovate, obtuse, veined, overlapping to the right; corona-lobes large, fleshy, the upper free portion rounded on the outer edge, obliquely truncate at top, and with a small apiculation on the inner edge, which lies against the top of the anther. Staminal-column arising from the base of the corolla; anther-tips membranous, broadly ovate-oblong, obtuse; pollen-masses oblong, attached to the pollen-carriers by very short caudicles. Style-apex dome-shaped. Follicles 3–4 in. long, slightly tapering to a very blunt point, rugosely striate, glabrous. Seeds broadly ovate, $\frac{1}{2}$ by $\frac{1}{3}$ in., flattened, strongly margined, pale yellowish-brown; coma $1\frac{3}{4}$ in. long, copious. *Dregea volubilis*, Benth. ex Hook. f. Fl. B. I. v. 4 (1883) p. 46; Trim. Fl. Ceyl. v. 3, p. 161; Talb. Trees, Bomb. ed. 2, p. 237; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 3, p. 193. *Hoya viridiflora*, R. Br. in Mem. Wern. Soc. v. 1, p. 27; Grah. Cat. p. 119; Dalz. & Gibs. p. 153. *Asclepias volubilis*, Linn. f. Suppl. p. 170. *Hoya Lacuna*, Ham. in Wall. Cat. 8169.—Flowers: Apr.–May. VERN. *Hirandodi*; *A'mbri*.

DECCAN: Mahableshwar, *Cooke*!; Máwal near Poona, *Woodrow*!; Kadakvasla, *Cooke*! S. M. COUNTRY: Belgaum and Padshapur, *Ritchie*, 437!—DISTRIB. India (Bengal, Assam, W. Peninsula); Ceylon, Java.

3. **Marsdenia lanceolata,** *T. Cooke.* Suberect or climbing; old stems with pale bark, glabrous or nearly so; young branches terete, thinly tomentose. Leaves 2–2¼ by ½–¾ in., lanceolate, acute or acuminate, glabrous or slightly velvety-pubescent above, glabrous and reticulately veined beneath, base acute; petioles ⅛ in. long. Flowers green, in rather small lateral globose cymes; peduncles ¼–¾ in. long, arising between the petioles and near to one of them; pedicels ¼–½ in. long, slender. Calyx glabrous, divided to the base; sepals 1/10–⅛ in. long, oblong, obtuse. Corolla divided rather more than ½-way down; lobes ⅛–⅙ in. long, broadly oblong, obtuse, overlapping to the right; corona-lobes large, fleshy, rounded at the top, the apiculation on the inner edge very small. Anther-tips membranous, obtuse; pollen-masses erect, oblong, attached to the pollen-carriers by short caudicles. Style-apex dome-shaped, not exserted beyond the anthers. Follicles not seen. *Dregea volubilis* var. *angustifolia*, Hook. f. Fl. B. I. v. 4, p. 47.—Flowers: July–Aug.

The entirely different leaves, short petioles and peduncles, and the different flowering period are I think sufficiently distinctive characters to separate this from *M. volubilis.*

Dalzell in Herb. Kew. without locality! DECCAN: Lohagaon 11 miles S.E. of Poona, *Bhiva*!—DISTRIB. India (W. Peninsula).

18. **COSMOSTIGMA,** Wight.

A twining glabrous shrub. Leaves opposite. Flowers small, greenish, in racemose axillary or lateral cymes. Calyx 5-partite. Corolla subrotate, deeply 5-fid; lobes valvate or slightly overlapping to the right; corona of 5 erect broad membranous truncate or 2-fid scales adnate to the base of the anthers and shorter than them. Staminal-column very short; anthers appendiculate with a rounded inflexed membrane; pollen-masses 1 in each anther-cell, erect, attached to the pollen-carriers by long basal caudicles. Style-apex broad, 5-gonous, with a distinct rim and slightly umbonate centre. Follicles large, ovoid-oblong, bluntly pointed, smooth. Seeds comose.—DISTRIB. India, Ceylon, Java; species 1.

1. **Cosmostigma racemosum,** *Wight, Contrib.* (1834) p. 42. A shrubby twiner; stems stout, terete, usually quite glabrous. Leaves deciduous, 3–5 by 2–3 in., ovate, acute or acuminate, glabrous, base cordate; petioles ¾–1½ in. long. Flowers small, greenish, in axillary or sublateral cymes which are at first corymbose, at length racemose; peduncles equalling or exceeding the petioles, arising either from the leaf-axils or just outside them; pedicels ¼–½ in. long; bracts 0. Calyx divided almost to the base, glabrous; segments 1/12 in. long, broadly oblong, rounded at the apex and with membranous ciliate margins. Corolla ⅛ in. long; lobes ⅛ in. long, ovate-oblong, obtuse, fleshy, speckled with brown dots; corona of 5 usually 2-fid broad membranous erect scales. Staminal-column arising from near the base of the corolla; pollen-masses clavate, slightly curved, erect, waxy, attached to the

pollen-carriers by very long slender flexuous caudicles. Style-apex broad, 5-gonous, with a distinct rim, slightly umbonate in the centre. Follicles 3–7 by 1½ in., ovoid-oblong, bluntly pointed, smooth. Seeds ½ in. long, ovate, margined; coma 1 in. long. Fl. B. I. v. 4, p. 46; Grah. Cat. p. 119; Dalz. & Gibs. p. 151; Wight, Icon. t. 591; K. Schum. in Engl. & Prantl, Pflanzenf. v. 4, part 2, p. 294, fig. 90, F; Trim. Fl. Ceyl. v. 3, p. 160; Talb. Trees, Bomb. ed. 2, p. 237; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167.—Flowers: June–Aug. VERN. *Jati.*

KONKAN: *Talbot*; Parel hill (Bombay), *Graham.* KANARA: *Talbot.*—DISTRIB. India (Silhet, Chittagong, W. Peninsula); Ceylon, Java.

19. **HETEROSTEMMA,** W. & A.

Twining shrubs. Leaves opposite, glandular at the base on the upper surface. Flowers small, in lateral umbellate or racemose sessile or shortly pedunculate cymes. Calyx 5-partite. Corolla divided ½-way down or more; lobes triangular, valvate or slightly overlapping to the right; corona of 5 large fleshy lobes spreading horizontally from the staminal-column, usually with a large erect appendage on the upper side. Staminal-column small, depressed; anthers minute, terminated by a small membranous appendage; pollen-masses 1 in each anther-cell, ovoid, attached by very short caudicles to the pollen-carriers. Style-apex 5-gonous, truncate, not exserted beyond the anthers. Follicles slender, straight, pointed, glabrous. Seeds comose.—DISTRIB. India and Malaya; species about 10.

1. **Heterostemma Dalzellii,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 48. A perennial twiner; stems long, glabrous, terete, slender. Leaves thin, 3–6 by 1¼–3¼ in., ovate or ovate-oblong, acuminate, glabrous, base rounded or cordate, rarely subacute; main nerves 3–5 from the base; petioles ¾–1½ in. long, with glands above them on the upper surface of the leaf. Flowers in lateral subsessile cymes; peduncles when present arising from between the petioles; pedicels short, stout, glabrous. Calyx small, glabrous, divided almost to the base; segments scarcely $\frac{1}{20}$ in. long, ovate-oblong, obtuse. Corolla fuscous within (*Dalzell*), ⅛ in. long, divided to a little below the middle; lobes $\frac{1}{16}$ in. long, ovate, acute; corona very conspicuous, of 5 large subspathulate lobes projecting horizontally from the staminal-column and lying flat on it when expanded, without appendages on the upper side. Staminal-column very short; pollen-masses with a pellucid apical margin, waxy, attached to the pollen-carriers by very short caudicles. Style-apex depressed. Follicles 3–4 in. long, straight, tapering to a point at the apex, not or scarcely tapered at the base, striate, glabrous. Seeds few, ⅜ in. long, oblong, narrowly margined; coma 1 in. long. Talb. Trees, Bomb. ed. 2, p. 238. *Heterostemma Wallichii*, Dalz. & Gibs. p. 152 (*not* of Wight). —Flowers: Aug.–Sept.

KONKAN: *Stocks*!; Vingorla, *Dalzell*!; Malwán, *Dalzell & Gibson.* DECCAN: near Poona, *Talbot.*—DISTRIB. India (W. Peninsula).

20. **HOYA**, R. Br.

Twining or climbing pendulous (rarely erect), sometimes epiphytic shrubs. Leaves opposite, thick and fleshy. Flowers in axillary, lateral or terminal umbels (rarely fascicled). Calyx small, 5-partite. Corolla rotate, fleshy or waxy; lobes 5, often convex and spreading or reflexed, valvate in bud; corona of 5 fleshy membranous or horny lobes, adnate to the staminal-column, stellately spreading or ascending, turgid or compressed, often concave on the upper surface, the inner margin usually produced into a tooth or process, which is erect and incumbent on the anther. Staminal-column short, arising from the base of the corolla; anthers conniving over the apex of the style, terminated by an erect or inflexed membranous appendage; pollen-masses 1 in each anther-cell, erect, waxy, usually attached to the pollen-carriers by distinct caudicles. Style-apex included, flat or scarcely apiculate. Follicles various, usually slender with a thin pericarp, rarely turgid with a thick one. Seeds small; coma long.—DISTRIB. Tropical Asia, Malaya, and Australia; species about 60.

Leaves linear, not more than $\frac{1}{8}$ in. broad at the widest part; flowers 1–3-nate ..... 1. *H. retusa.*
Leaves ovate or elliptic, $\frac{3}{4}$ in. or upwards at the widest part; flowers in many-flowered umbels.
  Calyx and corolla-lobes glabrous.
    Corona-lobes with the broad end outside ..... 2. *H. Wightii.*
    Corona-lobes with the narrow end outside..... 3. *H. ovalifolia.*
  Calyx and corolla-lobes hairy ..... 4. *H. pendula.*

1. **Hoya retusa,** *Dalzell, in Kew Journ. Bot.* v. 4 (1852) p. 294. Parasitic on trees, pendulous, glabrous; stem very slender, terete. Leaves $1\frac{1}{2}$–$2\frac{1}{2}$ by $\frac{1}{5}$–$\frac{1}{3}$ in. at the widest part, pale, fleshy, linear, gradually increasing in width from the base to the obcordate apex, furrowed on the upper surface, glabrous; petioles $\frac{1}{10}$–$\frac{1}{6}$ in. long. Flowers 1–3-nate, subaxillary; pedicels filiform, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Calyx minute, divided to the base; sepals $\frac{1}{20}$ in. long, deltoid-ovate, subacute. Corolla white, shining, $\frac{1}{2}$–$\frac{3}{4}$ in. across; lobes $\frac{1}{6}$ in. long, broadly deltoid, acute, with velvety-pubescent margins; corona pink, the lobes $\frac{1}{12}$ in. long, horizontal, ovate-oblong, stellately spreading, the broad end outwards. Pollen-masses erect, oblong or slightly clavate, waxy. Follicles not seen. Fl. B. 1. v. 4, p. 56; Dalz. & Gibs. p. 153; Talb. Trees, Bomb. ed. 2, p. 238; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167.—Flowers: July. VERN. *Jamaki*; *Dhákti-A'mbri.*

KONKAN: *Stocks!* KANARA: common in the forests of Yellapur, *Talbot*; Dandeli woods, *Dalzell!*; Yacombi, *Woodrow*; Kála naddi, *Ritchie*, 1860!—DISTRIB. India (W. Peninsula), apparently endemic.

2. **Hoya Wightii,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 59. A stout glabrous climber. Leaves thick, pale, $2\frac{1}{2}$–$3\frac{1}{2}$ by $1\frac{1}{4}$–$1\frac{3}{4}$ in., elliptic or elliptic-lanceolate, bluntly acuminate, the margins recurved, base acute or subacute, rarely rounded; main nerves nearly horizontal with reticulate venation between them; petioles $\frac{1}{3}$–$\frac{3}{4}$ in. long. Flowers in lateral pedunculate umbels; peduncles $\frac{1}{4}$–$\frac{3}{8}$ in. long, arising from between the petioles; pedicels stout, $\frac{3}{4}$–1 in. long. Calyx glabrous, divided almost to the base; segments $\frac{1}{12}$ in. long, oblong, the margins sometimes slightly ciliolate. Corolla cream-colored, glabrous inside, $\frac{3}{4}$ in. across;

lobes ¼ in. long, deltoid, acute; corona of 5 fleshy lobes, stellately radiating from the column, the broad end outside, subquadrate in transverse section, the inner margin of each lobe with an obtuse process which rests against the back of the anther. Pollen-masses clavate, compressed, attenuated at the base into a distinct caudicle, waxy, without a pellucid margin. Follicles 3–4 by ¼ in., slender, straight, cylindric, very slightly tapering towards the ends. Seeds lanceolate, ⅛ in. long, narrowed at both ends; coma nearly 2 in. long. Talb. Trees, Bomb. ed. 2, p. 238; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167. *Hoya pendula*, Wight & Arn. in Wight, Contrib. p. 36 (exclud. syn.), *not* of Wight, Icon. t. 575; Grah. Cat. p. 119. *H. pallida*, Dalz. & Gibs. p. 152. *H. parasitica*, Grah. Cat. p. 119 (*not* of Wall.).—Flowers: Oct.–Dec. VERN. *A'mbri*; *Dudh-yel*.

KONKAN: *Law*!, *Stocks*!, *Dalzell*!; Nagotna jungles, *Graham*. DECCAN: Lanoli, *Graham*; Mahableshwar, *Graham*, *Cooke*! KANARA: common on the Supa Ghâts, *Talbot*; Sampkhand (N. Kanara), *Woodrow*.—DISTRIB. India (W. Peninsula).

3. **Hoya ovalifolia,** *Wight & Arn. in Wight, Contrib.* (1834) p. 37. A twining glabrous shrub. Leaves 2–4 by ¾–1½ in., without recurved margins, elliptic-lanceolate, obtuse or acute, very thick, glabrous, pale beneath, base usually acute; petioles ⅛–¼ in. long. Flowers greenish- or purplish-white in lateral pedunculate umbels; peduncles stout, ¾–1 in. long, arising from between the petioles; pedicels ½ in. long. Calyx glabrous, divided almost to the base; segments 1/12 in. long, ovate-oblong, subacute. Corolla ⅓–½ in. across when expanded, divided about ⅔ of the way down; lobes ⅙ in. long, ovate, acute; corona of 5 large lobes 1/10 in. long, radiating from the staminal-column, the narrow end outside, the upper surface concave, the inner end prolonged into a cuspidate point. Anther-appendages large, ovate, acute, membranous; pollen-masses erect, subsessile on the pollen-carriers, oblong, without a pellucid margin. Follicles 5–6 in. long, very slender, curved. Fl. B. I. v. 4, p. 60; Wight, Icon. t. 847; Trim. Fl. Ceyl. v. 3, p. 162; Talb. Trees, Bomb. ed. 2, p. 239.

KANARA: N. Kanara, *Talbot*.
This plant has been included on the authority of Mr. Talbot, who reports its occurrence in N. Kanara. I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew.—DISTRIB. India (W. Peninsula); Ceylon.

4. **Hoya pendula,** *Wight, Icon.* t. 474 (not of W. & A. in Wight, Contrib.). A twining shrub; branches terete, sparsely hairy. Leaves 1¾–3 by 1–1½ in., with recurved margins, ovate-oblong, acute or acuminate, thick, glabrous, base rounded; petioles ¼ in. long. Flowers in lateral pedunculate umbels; peduncles ½ in. long, arising from between the petioles, stout, pubescent; pedicels slender, ⅞–1 in. long, sparsely hairy. Calyx hairy outside, divided almost to the base; segments ⅛ in. long, lanceolate, acute. Corolla divided about ½-way down, silky-villous inside; lobes ¼ in. long, broadly ovate-deltoid, acute, the inside faces and margins silky-villous; corona-lobes ⅛ in. long, ovate-lanceolate, the outer end the narrower, subacute, the process from the inner margin ovate, acute, short. Follicles not seen. Fl. B. I. v. 4, p. 61; Dalz. & Gibs. p. 152; Talb. Trees, Bomb. ed. 2, p. 239; Woodr. in Journ.

Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 4, p. 302.—Flowers: July–Nov.

KONKAN: hills of the Kolaba district, *Talbot*; hills near Nagotna, *Dalzell & Gibson*; Southern Konkan, *Nimmo* ex *Dalzell & Gibson*.—DISTRIB. India (W. Peninsula).

Hoya carnosa, R. Br. in Mem. Wern. Soc. v. 1 (1811) p. 27. The *Wax-plant*. Leaves fleshy, elliptic-oblong, acuminate. Flowers pinkish-white, in pendulous umbels on short peduncles; corolla fleshy, bearded inside. A native of Queensland, grown commonly in gardens. There is a form with variegated leaves. Grah. Cat. p. 118; Dalz. & Gibs. Suppl. p. 54; Woodr. Gard. in Ind. ed. 5, p. 384.

Hoya Griffithii, Hook. f. Fl. B. I. v. 4 (1883) p. 59. A native of the Khasia mountains, sometimes grown in gardens in the Presidency. It has thick elliptic or oblanceolate leaves and rosy flowers rather larger than those of *Hoya carnosa*. Woodr. Gard. in Ind. ed. 5, p. 385.

21. **OIANTHUS,** Benth.

Twining undershrubs. Leaves opposite. Flowers in lateral few-flowered small, subsessile cymes. Calyx 5-partite. Corolla ovoid-urceolate or disciform; lobes 5, short, broad, valvate; corona adnate to the staminal-column, cupular, spreading, fleshy, lobed, toothed, or entire at the apex. Staminal-column arising from the base of the corolla, minute, short, depressed; anther-appendages short, inflexed; pollen-masses 1 in each anther-cell, waxy, ovoid, compressed, ascending, attached to the pollen-carriers by very short caudicles, the inner margin often pellucid. Style-apex broadly conical, not exserted beyond the anthers. Fruit not known. — DISTRIB. India (W. Peninsula); species 3.

Bentham inclines to the opinion that this genus together with the genus *Asterostemma*, Decaisne, might be included under *Heterostemma*.

Corolla urceolate; corona-lobes 3-toothed at the apex ..... 1. *O. urceolatus*.
Corolla disciform; corona-lobes entire at the apex ..... 2. *O. disciflorus*.

1. **Oianthus urceolatus,** *Benth. in Hook. Icon. Pl.* t. 1191. A twining undershrub; stem purple, puberulous. Leaves 2–4 by 1–2 in., ovate, acute or acuminate, glabrous, base rounded or subcordate, 3–5-nerved; petioles $\frac{1}{4}$ in. long, with glands above them on the upper side of the leaf. Flowers in lateral few-flowered sessile or shortly pedunculate cymes; peduncles when present arising from between the petioles; pedicels shorter than the petioles. Calyx minute, 5-partite; segments $\frac{1}{20}$ in. long, oblong, obtuse. Corolla shortly 5-fid at the apex, urceolate, $\frac{3}{8}$–$\frac{3}{4}$ in. long, reddish-purple outside, dark-purple within; lobes triangular, $\frac{1}{12}$–$\frac{1}{8}$ in. long, with minute teeth between them; corona arising from the staminal-column, of 5 fleshy lobes exceeding the column and forming a cup around it, each lobe 3-toothed at the apex, the terminal tooth bent inwards. Anthers short, terminated by a colored membranous appendage; pollen-masses 1 in each anther-cell, erect, ovoid-oblong, slightly compressed, the inner margin pellucid (*Dalzell*); caudicle short. Follicles not seen. Fl. B. I. v. 4, p. 49; K. Schum. in Engl. &

Prantl, Pflanzenf. v. 4, part 2, p. 294, fig. 90, J–K; Talb. Trees, Bomb. ed. 2, p. 238; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167. *Heterostemma urceolatum*, Dalz. in Kew Journ. Bot. v. 4 (1852) p. 295; Dalz. & Gibs. p. 152.—Flowers: July–Aug.

Rare. DECCAN: Poona, *Woodrow*. S. M. COUNTRY: hills near Belgaum, *Dalzell, Ritchie*, 1112!—DISTRIB. India (W. Peninsula), apparently endemic.

2. **Oianthus disciflorus,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 49. A twining undershrub, glabrous or nearly so; young stems pubescent. Leaves 3–5 by 1½–2½ in., elliptic-oblong or ovate-oblong, acute or obtuse, glabrous, base rounded or subcordate; petioles ¾–1 in. long. Flowers in small subsessile lateral cymes arising from between the petioles. Calyx divided nearly to the base; segments $\frac{1}{16}$ in. long, oblong, obtuse. Corolla disciform, vertically depressed; corona 5-lobed, with entire, somewhat incurved apex. Follicles not seen.

There are two sheets in Herb. Kew. each ticketed "Kanara & Mysore, Law" with a query, and each also bearing a ticket "Konkan, Stocks," neither ticket being in the handwriting of either Law or Stocks. The habitat of the plant is therefore uncertain.

22. LEPTADENIA, R. Br.

Erect or twining shrubs with much-branched rush-like stems. Leaves opposite, variable in the same species, sometimes absent. Flowers small, in umbellate lateral sessile or pedunculate many-flowered cymes. Calyx more or less deeply 5-fid. Corolla deeply divided, rotate or with a very short campanulate tube; lobes 5, pubescent or bearded inside, valvate in bud; corona double, the corolline of 5 short transverse or rounded fleshy lobes tipped with a tuft of hairs or with a subulate hairy point, inserted at the sinuses of the corolla, the staminal corona of a raised undulate fleshy ring at the base of the staminal-column. Staminal-column arising from the base of the corolla; anthers incumbent on the top of the style, without terminal appendages; pollen-masses 1 in each anther-cell, suberect, pellucid at the apex, attached in pairs by short caudicles to the pollen-carriers. Follicles smooth. Seeds comose.—DISTRIB. Tropical Asia and Africa; species about 12.

Leafy twining shrub ..... 1. *L. reticulata.*
An erect shrub, leafless (except occasionally the young shoots) ... 2. *L. Spartium.*

1. **Leptadenia reticulata,** *Wight & Arn. in Wight, Contrib.* (1834) p. 47. A twining shrub; stems with corky deeply cracked bark; branches numerous, the younger ones terete, glabrous or hoary-puberulous. Leaves thinly coriaceous, 1½–3 by ¾–1¾ in., ovate, acute, glabrous above, more or less finely pubescent (especially on the nerves) beneath, base rounded or subcordate (rarely subacute); petioles ¼–¾ in. long, puberulous. Flowers greenish-yellow, in lateral or subaxillary many-flowered hoary-puberulous globose cymes; peduncles arising from between the leaves or subaxillary, sometimes in pairs, puberulous; pedicels ⅛–⅙ in. long, puberulous. Calyx pubescent outside, divided to about the middle; segments $\frac{1}{20}$ in. long, ovate-oblong, subacute. Corolla ⅕ in. long (about ⅓ in. across when expanded); tube very short, glabrous; lobes of the limb thick, $\frac{1}{10}$ in. long, ovate-oblong, subobtuse, with revolute margins, pubescent on both surfaces, often with a small hairy process (absent in Deccan specimens) on the inner face near the

tip; corolline corona of 5 quadrate truncate fleshy lobes at the sinuses; staminal corona minute, annular, close to the staminal-column. Anthers without membranous appendages, incumbent on the style-apex; pollen-masses ovoid, large, waxy, pellucid at the apex, attached to the minute pollen-carriers by moderately long caudicles. Follicles subwoody, 2½–3½ in. long, turgid, tapering into an obtuse shortly curved beak. Seeds ¼ in. long, narrowly ovate-oblong, acute; coma 1¼–1½ in. long. Fl. B. I. v. 4, p. 63; Grah. Cat. p. 118; Dalz. & Gibs. p. 152; Trim. Fl. Ceyl. v. 3, p. 164; Talb. Trees, Bomb. ed. 2, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 4, p. 630. — Flowers: Apr.–July. VERN. *Hirandodi*; *Kharkhoda*; *Shinguti*.

KONKAN: common, particularly near the sea, *Dalzell & Gibson*. DECCAN: Poona, *Cooke*!, *Woodrow*! S. M. COUNTRY: *Graham*; Dambal, in the Dharwar district, *Talbot*. KANARA: Jatihalli on the Kála naddi, *Ritchie*, 1857! GUJARAT: hedges about Surat, *Graham*; Kernali, *Kanitkar*!—DISTRIB. India (Panjáb, Birma, W. Peninsula); Ceylon, Singapore, Ava.

2. **Leptadenia Spartium,** *Wight, Contrib.* (1834) p. 48. A much-branched often leafless bush 2–6 ft. high; branches erect, slender, terete, straight, the young ones puberulous. Leaves present on the young shoots only (not always so), 1–2¼ by ⅛ in., linear or linear-lanceolate, acute, glabrous, subsessile. Flowers yellow, in small lateral umbellate pubescent cymes; peduncles $\frac{1}{10}$–$\frac{1}{6}$ in. long, pubescent, arising from between the petioles when leaves are present; pedicels $\frac{1}{16}$–$\frac{1}{10}$ in. long, pubescent. Calyx pubescent, divided to about the middle; segments $\frac{1}{30}$ in. long, ovate-deltoid, acute. Corolla ⅛ in. long, deeply divided; tube funnel-shaped, short, glabrous; lobes $\frac{1}{10}$ in. long, ovate-oblong, subacute, thickened towards the apex, puberulous outside, pubescent inside; corona-lobes at the sinuses of the corolla very small, tubercle-like, pubescent at the apex, the staminal corona minute, annular, close to the base of the staminal-column. Staminal-column very short; pollen-masses erect, with pellucid apex, attached to minute pollen-carriers by short caudicles. Follicles 3½–4½ by ¼ in., lanceolate, terete, attenuated into a long slender beak, slightly narrowed at the base, glabrous. Seeds ⅓ in. long, narrowly lanceolate, glabrous; coma 1–1½ in. long. Fl. B. I. v. 4, p. 64; Talb. Trees, Bomb. ed. 2, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 4, p. 630. *Leptadenia Jacquemontiana*, Decaisne, in DC. Prodr. v. 8 (1844) p. 641; Dalz. & Gibs. p. 152.—Flowers: Dec.–Jan. VERN. *Kip*.

Abundant in Kathiawar and Sind. GUJARAT: Kathiawar, *Dalzell*!; sea-shore south of Gogo, plentiful, *Dalzell & Gibson*; Perim Island at the mouth of the Narbada river, *Raoji*! SIND: *Stocks*, 408!; Mándvi, *Woodrow*; Shikarpur, *Cooke*!—DISTRIB. India (Panjáb); Beluchistan, Arabia, Egypt.

The fibre is used for making ropes for drawing water from wells as it does not rot. The branches are used as fodder for cattle. See Watt, Dict. Econ. Prod. l. c.

23. **CEROPEGIA,** Linn.

Perennial herbs erect or twining; rootstock often tuberous. Leaves opposite, sometimes minute or 0. Flowers often large, in lateral (rarely terminal) umbellate or racemose cymes, rarely solitary or in pairs. Calyx 5-partite. Corolla tubular, usually elongate, more or less

inflated at the base, straight or curved; lobes 5, more or less connate at their tips, valvate in bud; corona staminal, double, arising from the staminal-column, the outer corona cup-shaped, entire or 5-10-toothed, or of 5 bifid lobes more or less adnate to the inner corona-lobes and often appearing to form one series with them, or reduced to minute pouches alternating with the stamens, the inner corona of 5 short or long lobes opposite the anthers and incumbent on them or erect, dorsally adnate at their base to the cup of the outer corona or laterally to its lobes, when the corona appears to be formed of 5 lobes with a tooth on each side at the base. Staminal-column arising a little above the base of the corolla, very short, included in its inflated basal part; anthers oblong or subquadrate without appendages; pollen-masses erect, ascending or subhorizontal, 1 in each anther-cell, attached to the pollen-carriers by short caudicles or subsessile. Style-apex not exserted, truncate or shortly conical. Follicles lanceolate or linear-fusiform, acuminate, smooth. Seeds comose.—DISTRIB. Africa, East Indies, Malayan Archipelago, and Australia; species perhaps 80 or more.

A genus of plants the flowers of which are of curious form, many of them large and beautifully colored. Unfortunately it is by no means easy to dry them so as to produce good Herbarium specimens. Owing to the unavoidable deformations which occur in pressing plants of a succulent nature, the floral organs of which are extremely delicate, systematic work with Herbarium specimens is far from satisfactory. In order to discriminate accurately between the several species of the genus, living plants should be examined and careful dissections and colored drawings of the flowers made. As most of the species appear in the rainy season, their collection in the jungles during the wet weather is neither easy nor pleasant, but there can be little doubt that the Konkan and Deccan jungles would, if they could be explored during the months of July and August when most of the species flower, yield some new species to an adventurous botanist, while seeds and tubers would be welcomed as valuable contributions to conservatories at home. The islands in the harbor of Bombay may be suggested as affording a good hunting-ground.

Stem erect.
- Leaves linear, less than ½ in. wide; corolla-lobes as long as or longer than the tube ..... 1. *C. attenuata.*
- Leaves ovate, 1 in. or more wide; corolla-lobes shorter than the tube ..... 2. *C. Lawii.*

Stem twining.
- Leaves fleshy.
  - Leaves small, less than 1 in. long, or 0 ..... 3. *C. juncea.*
  - Leaves exceeding 1 in. long, never wanting ..... 4. *C. bulbosa.*
- Leaves membranous.
  - Corolla-lobes ½ as long as the tube.
    - Leaves and peduncles glabrous; corolla-lobes contracted into a narrow beak in bud ..... 5. *C. tuberosa.*
    - Leaves and peduncles pubescent or hispid; corolla-lobes forming a clavate head in bud.
      - Inner corona-lobes hooked ..... 6. *C. hirsuta.*
      - Inner corona-lobes straight.
        - Corolla-tube much inflated (almost globose) at the base; corolla-lobes lanceolate ..... 7. *C. oculata.*
  - Corolla-lobes as long as or nearly as long as the tube.
    - Corolla-tube slightly inflated at the base; corolla-lobes linear ..... 8. *C. Stocksii.*

1. **Ceropegia attenuata,** *Hook. Icon. Pl.* v. 9 (1852) t. 867. Erect, 6–12 in. high; root tuberous; stem more or less pubescent when young, when mature glabrous. Leaves 2–6 by ⅛–⅜ in., linear, acute, narrowed

at the base, subsessile, the young ones more or less pubescent; midrib strong. Flowers usually solitary at the apex of a pubescent peduncle ½ in. long, which arises from between the petioles. Calyx divided to the base; sepals ¼–⅓ in. long, subulate, hairy down the middle of the back. Corolla 2¼ in. long, straight; tube 1 in. long, cylindric, inflated at the base, closely striately veined; lobes 1¼ in. long, deltoid for ⅕ in., then narrowly linear, united at the tip; outer corona-lobes deltoid-oblong, deeply bifid, the segments very acute, ciliate with long very fine hairs; inner corona-lobes linear, ⅛ in. long. Follicles 2–3 by $\frac{1}{10}$ in., cylindric, pointed, glabrous, torulose, on a peduncle ¾ in. long. Seeds ovoid-oblong, ⅛ in. long, with a thick margin; coma ½ in. long. Fl. B. I. v. 4, p. 67; Dalz. & Gibs. p. 154; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168. *Ceropegia angustifolia*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 259; Dalz. & Gibs. p. 154 (*not* of Wight).—Flowers: July–Sept.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!; near Vingorla, *Dalzell*!, *Ritchie*!; Malwán, *Dalzell*. DECCAN: hill near Junnar, *Woodrow*.—DISTRIB. India (W. Peninsula).

2. **Ceropegia Lawii,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 67. Erect, 15–20 in. high; root a tuber 2–3 in. in diam.; stems stout, succulent, more or less pubescent or glabrous. Leaves 2–4 by 1–2 in., ovate or ovate-lanceolate, usually acute, glabrous, base acute, rarely rounded or truncate; petioles ½–¾ in. long, glabrous. Flowers in pedunculate cymes; peduncles many-flowered, arising from between the petioles or subaxillary, more or less hairy; pedicels short, hairy; bracts lanceolate-subulate. Calyx divided to the base; sepals ⅛–¼ in. long, linear-lanceolate acute. Corolla 1–1¼ in. long; tube more or less inflated at the base, ¾–1 in. long, closely striate; lobes incurved, forming a small globose head; outer corona 10-toothed, the teeth short, obtuse, ciliate with long fine hairs; inner corona-lobes linear, $\frac{1}{12}$ in. long. Follicles not seen. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168.—Flowers: Aug.

KONKAN: *Stocks*!, *Law*!, *Dalzell*. DECCAN: Khandala, *Woodrow*; Purandhar, *Woodrow*; Mahableshwar, *H. M. Birdwood*.—DISTRIB. India (W. Peninsula).

3. **Ceropegia juncea,** *Roxb. Cor. Pl.* v. 1 (1795) p. 12, t. 10. Twining, fleshy, glabrous; root tuberous, with numerous branched fibres. Leaves small or 0; when present sessile, distant, ⅜–¾ by ⅛–¼ in., lanceolate, acute, fleshy. Flowers in 3–5-flowered umbellate pedunculate cymes; peduncles ½–1 in. long, arising from between the petioles, stout; pedicels short, stout. Calyx divided to the base; sepals ⅕ in. long, lanceolate, acute. Corolla 1½–2 in. long, curiously variegated with green, yellow, and purple; tube inflated at the base, funnel-shaped above the middle; lobes about as long as the tube, linear from a broad elliptic-oblong base, slightly clavate at the apex, the tips connate; outer corona of 5 subquadrate deeply bifid lobes, the segments subdeltoid with a wide sinus, ciliate with fine hairs; inner corona-lobes $\frac{1}{10}$ in. long, linear, with hooked tips. Follicles 6–7 by ¼ in. Fl. B. I. v. 4, p. 68; Grah. Cat. p. 117; Dalz. & Gibs. p. 153; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168.—Flowers: Aug.–Sept. VERN. *Kanvel.*

S. M. COUNTRY: Badami, *Woodrow*. KANARA: Kasersai jungles, *Dr. Lush* ex *Graham*.—DISTRIB. India (W. Peninsula).

4. **Ceropegia bulbosa,** *Roxb. Cor. Pl.* v. 1 (1795) p. 11, t. 7. Twining; root tuberous, the size of a small turnip, a little flattened, with several fibres from its base; stem very slender, usually glabrous. Leaves excessively variable (see the varieties). Flowers in pedunculate umbellate cymes; peduncles ½–1 in. long, arising from between the petioles; pedicels ⅛–¼ in. long, slender. Calyx divided to the base; sepals 1/12 in. long, lanceolate, acute. Corolla ½–¾ in. long, greenish; tube inflated at the base; lobes ⅙ in. long, linear from a deltoid base, hairy, connate at the tips, violet-purple inside; outer corona-lobes 5, minute; inner corona-lobes narrowly linear, 1/12 in. long. Pollen-masses erect, attached to the pollen-carriers by very short caudicles. Follicles 4 by ⅙ in., cylindric, tapering towards an acute apex, glabrous; pericarp thin. Seeds ⅓ in. long, ovate-oblong, flattened, with a broad submembranous margin; coma 1–1¼ in. long. Fl. B. I. v. 4, p. 67; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 2, p. 262.

The leaves and the tubers are eaten, the former, according to Roxburgh, tasting like purslane (*Portulaca oleracea*), the latter, when fresh, like raw turnips.—Distrib. India (Panjáb and Upper Gangetic plain, W. Peninsula).

Var. 1. *bulbosa proper*, Hook. f. Fl. B. I. v. 4 (1883) p. 68. Leaves petiolate, the lowest almost orbicular, the upper ones elliptic-oblong or obovate, rarely elliptic-lanceolate, usually apiculate, base rounded, truncate, subcordate or acute. Grah. Cat. p. 117; Dalz. & Gibs. p. 153; Wight, Icon. t. 845.—Flowers: Aug.

Konkan: Malabar Hill (Bombay), *Graham*; island of Karanja, *Dalzell & Gibson*. Deccan: 10 miles W. of Poona, *Woodrow*. S. M. Country: Belgaum, *Ritchie*, 1110!

Var. 2. *Lushii*, Hook. f. Fl. B. I. v. 4 (1883) p. 68. Leaves subsessile, fleshy, glaucous, 4–8 by ⅛–⅓ in., narrowly linear, acuminate. *Ceropegia Lushii* (sp.), Graham, in Bot. Mag. (1834) t. 3300; Grah. Cat. p. 117; Dalz. & Gibs. p. 154.

Rare. Kanara: Kasersai jungles, *Dr. Lush* ex *Graham*.

5. **Ceropegia tuberosa,** *Roxb. Cor. Pl.* v. 1 (1795) p. 12, t. 9. Twining, glabrous; root of many small tuberous knobs with fleshy fibres; stem slender. Leaves membranous, 1¼–4 by ½–2 in., the lower leaves suborbicular, the middle-stem leaves ovate, the upper oblong, all usually apiculate, glabrous, base rounded, acute or subcordate; petioles ¼–½ in. long. Peduncles 1–3 together, ½–3 in. long, arising from between the petioles or subaxillary; pedicels fascicled or subpaniculate, slender, glabrous; bracts subulate. Calyx divided to the base; sepals ⅛–⅕ in. long, narrowly lanceolate, acute, with scarious margins, more or less recurved. Corolla 1–1½ in. long; tube inflated at the base and enlarged at the mouth; limb suddenly contracted from a broad triangular base into linear lobes, at first connate throughout their entire length, appearing in bud like a narrow beak, afterwards free, about ½ as long as the tube; outer corona cupular, truncate, with 5 small pockets alternating with the inner corona-lobes, ciliate; inner corona-lobes 1/10 in. long, linear, slightly clavate at the apex. Pollen-masses with a pellucid apical margin, erect, attached to the pollen-carriers by very short caudicles. Follicles 3½–5 by ⅛ in., slender, straight or very slightly curved, tapering to a fine point, glabrous. Seeds ¼ in. long, linear-

oblong, strongly margined; coma 1–1½ in. long. Fl. B. I. v. 4, p. 70; Grah. Cat. p. 117; Dalz. & Gibs. p. 154; Wight, Icon. t. 353; Watt, Dict. Econ. Prod. v. 2, p. 262. *Ceropegia acuminata*, Grah. Cat. p. 117; Dalz. & Gibs. p. 153; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168 (*not* of Roxb.). *C. Candelabrum*, Roxb. Hort. Beng. p. 21; Grah. Cat. p. 117 (*not* of Linn.).—Flowers: Aug.

Konkan: *Nimmo* ex *Graham*. Deccan: Páshan near Poona, *Woodrow*. S. M. Country: about Dharwar, *Law* ex *Dalzell & Gibson*, *Graham*.—Distrib. India (W. Peninsula).

6. **Ceropegia hirsuta,** *Wight & Arn. in Wight, Contrib.* (1834) p. 30. Suffruticose, twining, hirsute or pubescent; roots tuberous. Leaves membranous, 2–4 in. long, varying from ovate-cordate, obtusely acuminate, to narrowly lanceolate, acute; petioles ½–1 in. long. Flowers in few-flowered umbellate cymes; peduncles ½–2 in. long, arising from between the petioles, hispid; pedicels ¼–½ in. long, hispid; bracts subulate. Calyx divided to the base; sepals ⅓ in. long, linear-subulate, very acute, hirsute with rigid hairs. Corolla greenish, blotched with purple, 1½–1¾ in. long, with a very large club-shaped head; tube inflated at the base, enlarged at the mouth; lobes about ½ as long as the tube, oblong-lanceolate, about ¼ in. broad at the widest part, connate at the tip; outer corona-lobes subquadrate, narrowed a little towards the more or less deeply bifid apex, the teeth deltoid, ciliate; inner corona-lobes ⅛ in. long, linear, curved or hooked at the slightly clavate apex. Follicles 4 by ⅛ in., finely pointed, glabrous. Seeds ⅓ in. long, narrowly oblong; coma 1–1¼ in. long. Fl. B. I. v. 4, p. 71; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168. *Ceropegia Jacquemontiana*, Dalz. & Gibs. Bo. Fl. p. 153 (*not* of Decaisne). *C. ophiocephala*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 259; Dalz. & Gibs. p. 154.—Flowers: Aug.–? Vern. *Hámana*.

Konkan: *Stocks*!, *Law*!; Vingorla, *Ritchie*, 1851!; island of Karanja, *Dalzell & Gibson*. Deccan: Páshan, 6 miles W. of Poona, *Tukaram*!; Poona districts, *Woodrow*!; Nanded, 10 miles W. of Poona, *Kanitkar*!—Distrib. India (W. Peninsula).

Var. *vincæfolia*, Hook. f. Fl. B. I. v. 4 (1883) p. 72. Leaves slightly downy on both sides; outer corona of 5 erecto-patent emarginate fleshy lobes tipped with long hairs. *Ceropegia vincæfolia* (sp.), Hook. in Bot. Mag. (1840) t. 3740.

Near Bombay, *Nimmo* ex *Dalzell & Gibson*.

I have seen no authentic specimens of this, which can hardly be considered a good variety. The only difference between it and *C. hirsuta proper* appears to be in the outer corona-lobes, which are described and figured in the Bot. Mag. (*l. c.*) as erecto-patent, emarginate.

7. **Ceropegia oculata,** *Hook. Bot. Mag.* (1844) t. 4093. Herbaceous, twining; stem and branches terete, glabrous. Leaves membranous, 4–6 by 1½–2½ in., ovate, acuminate, more or less pubescent, ciliate; base usually cordate; petioles ½–1 in. long. Flowers in 4–8-flowered umbellate cymes; peduncles 1½–2 in. long, arising from between the petioles, usually clothed with spreading hairs; pedicels ¼–⅝ in. long. Calyx divided to the base; sepals ⅓ in. long, linear-lanceolate, acute, glabrous or nearly so. Corolla 1¾–2¼ in. long, pale-green in the lower part, the upper part of the tube beneath the lobes spotted with purple; tube much

inflated, almost globose at the base, enlarged at the mouth; lobes ½ the length of the tube, erect, oblong-lanceolate, pubescent towards the upper part, the tips connate; outer corona of 5 shortly bifid lobes, the teeth acute, ciliate; inner corona-lobes slender, erect, straight, not hooked at the tip. Follicles not seen. Fl. B. I. v. 4, p. 72; Dalz. & Gibs. p. 154. —Flowers: Aug.-Sept.

KONKAN: *Stocks*! *Law*!; Bombay, *Dalzell & Gibson*. — DISTRIB. India (W. Peninsula).

8. **Ceropegia Stocksii,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 74. Twining; stem terete, glabrous. Leaves membranous, 2½–5 by 1–2¼ in., ovate, acuminate, puberulous on both sides, base rounded or subcordate, rarely subacute; petioles ½–1 in. long. Flowers in umbellate cymes; peduncles 1–1½ in. long, arising from between the petioles, 3-many-flowered, hairy; pedicels short. Calyx divided to the base, glabrous or nearly so; sepals reaching ¼ in. long, linear-subulate. Corolla reaching 2½ in. long, straight; tube slightly inflated at the base; lobes about equalling the tube, linear from a triangular base, connate at the tips; outer corona-lobes 5, deltoid, ciliate; inner corona-lobes linear-oblong or somewhat oblanceolate, erect, straight, not hooked at the tip. Follicles not seen.—Flowers: Aug.-Sept.

KONKAN: *Stocks*!, *Law*!; Uran (Bombay harbor), *Stocks*!—DISTRIB. India (W. Peninsula).

24. **FREREA,** Dalz.

A low fleshy glabrous perennial cæspitosely branched herb. Leaves opposite. Flowers lateral, solitary or in pairs. Calyx 5-partite. Corolla rotate; lobes 5, broadly deltoid, acute, valvate; outer corona cupular, with 5 short truncate or retuse lobes; inner corona of 5 linear narrow incurved truncate lobes resting against the anthers and inflexed over them. Staminal-column very short; anthers without appendages; pollen-masses 1 in each anther-cell, erect, with a pellucid margin. Style-apex nearly flat, not exserted. Follicles terete, smooth. Seeds comose. —DISTRIB. Western Peninsula of India; species 1.

1. **Frerea indica,** *Dalz. in Journ. Linn. Soc.* v. 8 (1865) p. 10, t. 3. A fleshy glabrous herb 4–6 in. high with thick branches. Leaves 1½ in. long, oblong, obtuse or subacute, fleshy, subsessile. Flowers solitary or in pairs; pedicels arising from between the petioles, very short. Calyx glabrous, divided about ⅔ the way down; lobes deltoid, acute. Corolla rotate, ¾ in. in diam., divided rather less than ½-way down; lobes deltoid, acute, fringed with fine hairs, purple, with a pale-yellow irregularly shaped spot in the centre of each lobe; corona purple, the outer cupular with 5 broad short truncate or sinuate lobes, the inner of 5 linear truncate lobes incurved at the apex and inflexed over the staminal-column. Staminal-column short; anthers red (*Dalzell*). Style-apex pearly white. Follicles not seen. Fl. B. I. v. 4, p. 76; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168.—Flowers: Sept.-Oct. VERN. *Shindal-nakudi.*

A rare plant, originally found by Dalzell on a hill near Junnar in the Poona districts. DECCAN: Hill fort, Junnar, *Ranade*!, *Woodrow*.—DISTRIB. Apparently endemic.

25. CARALLUMA, R. Br.

Succulent perennial branched almost leafless herbs ; stems usually angled, thick and fleshy. Flowers in few- or many-flowered fascicles or sessile umbels, at the base, apex, or along the sides of the stems between the angles, pedicellate or subsessile. Calyx 5-partite. Corolla rotate or broadly campanulate; lobes 5, valvate in bud; corona double, arising from the staminal-column, the outer corona annular or cupular, adnate to the backs of the inner corona-lobes at their base or connected to them by narrow partitions, 5-lobed, the lobes 2-cuspidate, the inner corona-lobes incumbent on the backs of the anthers and not exceeding them, or produced into erect connivent or recurved tips. Staminal column short, arising from the bottom of the corolla; anthers without appendages; pollen-masses horizontal or ascending, 1 in each anther-cell, pellucid along the inner margin or at the apex, attached to the pollen-carriers in pairs by short rather slender caudicles. Style-apex truncate, not exserted beyond the anthers. Follicles narrowly fusiform, linear-terete or 3-gonous, smooth. Seeds comose. The genus *Boucerosia*, Wight & Arn., has been included in this genus.—DISTRIB. Africa, Arabia, India, South Europe ; species about 30.

Corolla-lobes glabrous within ..... 1. *C. edulis.*
Corolla-lobes densely fimbriate within ..... 2. *C. fimbriata.*

1. **Caralluma edulis,** *Benth. Gen. Pl.* v. 2 (1876) p. 782. Erect, 6–18 in. high ; stem and branches subterete, 4-grooved. Leaves sometimes present on the young shoots, $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear, acute. Flowers 1–4 together from the apex or the nodes of the stem, subaxillary when leaves are present; pedicels $\frac{1}{8}$–$\frac{1}{2}$ in. long. Calyx divided to the base, glabrous; sepals $\frac{1}{10}$ in. long, ovate, acute, with membranous margins. Corolla campanulate, purple inside, $\frac{1}{4}$ in. long, glabrous within ; lobes $\frac{1}{6}$ in. long, ovate-lanceolate, acute ; outer corona 5-lobed, each lobe produced into 2 distant subulate teeth ; lobes of the inner corona $\frac{1}{25}$ in. long, linear, subacute. Pollen-masses subhorizontal, 1 in each anther-cell, attached to the pollen-carriers by short slender caudicles. Style-apex truncate, not exserted. Follicles not seen. Fl. B. I. v. 4, p. 76 ; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 2, p. 141. *Boucerosia edulis*, Edgew. in Journ. Linn. Soc. v. 6, p. 205, t. 1; Aitch. Pb. & Sind Pl. p. 90.—Flowers: Sept. VERN. *Pippa* ; *Pippu.*

In the Bombay Presidency confined to Sind. SIND : *Stocks!, Dalzell!* ; Jemadar ka Landa near Karachi, *Stocks*, 533 ! ; Mulir, 6 miles from Karachi, *Woodrow.*
The plant is eaten as a vegetable.—DISTRIB. India (Panjáb).

2. **Caralluma fimbriata,** *Wall. Pl. As. Rar.* v. 1 (1830) p. 7, t. 8. Erect, fleshy; stem diffusely branched, 4-angled to the extremities. Leaves present on the young shoots, minute, $\frac{1}{12}$ in. long, soon falling and leaving raised tooth-like points along the angles. Flowers terminal on the ends of the branches or at the upper nodes, solitary or 2 or 3 together on short pedicels. Calyx glabrous, divided to the base; lobes $\frac{1}{10}$ in. long, lanceolate, acute. Corolla rotate, nearly $\frac{3}{4}$ in. across when expanded, deeply divided; lobes $\frac{1}{5}$–$\frac{1}{4}$ in. long, linear-oblong, subobtuse with a long apiculus, purple, copiously fimbriate with long purple flattened hairs ; outer corona-lobes linear-oblong in the basal part which

is about $\frac{1}{48}$ in. long, divided above into 2 divergent points $\frac{1}{36}$ in. long; inner corona-lobes $\frac{1}{50}$ in. long, very obtuse, incumbent on the backs of the anthers and not exceeding them. Follicles 4–5 in. long, cylindric, tapering, slender, smooth, 1 of the pair often suppressed. Fl. B. I. v. 4, p. 77; Dalz. & Gibs. p. 155; Trim. Fl. Ceyl. v. 3, p. 168; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 2, p. 141. *Caralluma ascendens*, Grah. Cat. p. 118 (*not* of R. Br.).—Flowers: June. VERN. *Mákadsing* (monkey's horn).

DECCAN: *Dalzell & Gibson*; hills, *Woodrow*!; Bopudi, 3 miles N. of Poona, *Ganpat*!

The plant is eaten as a vegetable.—DISTRIB. India (W. Peninsula); Ava.

Cryptostegia grandiflora, R. Br. in Bot. Reg. (1819) t. 435. A lofty climber with glossy elliptic leaves 3–4 in. long, large rose-colored showy flowers and 3-winged follicles 4–5 in. long. The plant, which is a native of Tropical Africa, has been grown extensively in gardens in the Bombay Presidency, where it has become almost naturalized. It abounds in milky juice which supplies a fairly good caoutchouc which has not however as yet become an article of commerce. See Watt, Dict. Econ. Prod. v. 2, p. 625. Fl. B. I. v. 4, p. 6; Grah. Cat. p. 122; Dalz. & Gibs. Suppl. p. 54; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 166 & Gard. in Ind. ed. 5, p. 384.—Flowers: June–Sept. VERN. *Vilayti-vakundi.*

Asclepias curasavica, Linn. Sp. Pl. (1753) p. 215. Introduced from the West Indies, where it is known to the colonists as the *bastard* or *wild Ipecacuanha*. It is rapidly becoming naturalized in W. India and used to be very abundant in the fields near the Railway station at Poona. It has linear-lanceolate leaves and rather handsome orange-colored flowers. Fl. B. I. v. 4, p. 18; Grah. Cat. p. 120; Dalz. & Gibs. Suppl. p. 54; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167; Watt, Dict. Econ. Prod. v. 1, p. 343.—Flowers: Feb.–Dec.

Stephanotis floribunda, Brongn. in Ann. Sc. Nat. sér. 2, v. 7 (1837) p. 30. A handsome climbing shrub a native of Madagascar (sometimes known as the *Madagascar Jasmine*), with opposite coriaceous elliptic smooth leaves and highly fragrant white flowers in umbelliform cymes. A very ornamental plant much grown in gardens. Dalz. & Gibs. Suppl. p. 54; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 167 & Gard. in Ind. ed. 5, p. 383.

Stapelia grandiflora, Masson, Stapel. (1796) p. 13, t. 11. A low thickly-fleshy leafless succulent plant a native of S. Africa, with quadrangular clavate branches and a fœtid hairy corolla 3 in. in diam., dark purple at the bottom, the ovate-lanceolate lobes of a lighter purple striped with white. This strange-looking plant thrives on a dry bank and requires little care. Woodr. Gard. in Ind. ed. 5, p. 385.

Order LXXXIV. LOGANIACEÆ.

Trees, shrubs, or herbs. Leaves opposite (rarely ternate), entire; stipules present or reduced to a transverse line. Flowers usually regular, hermaphrodite, generally in 2-3-chotomous cymes, various in size and color. Calyx inferior; tube short; lobes usually 4–5. Corolla gamopetalous, 4–5-lobed or -partite; lobes imbricate or valvate. Stamens 4–5 inserted on the corolla-tube, alternate with its lobes; anthers 2-celled. Ovary free, usually 2-celled; ovules 1–many in each cell; styles 1 or 2. Fruit capsular or indehiscent, 1–many-seeded. Seeds various, albuminous; embryo usually straight; cotyledons broad or narrow; radicle usually inferior.—Distrib. Chiefly tropical and subtropical; genera 30; species 400.

Herbs.
- Cymes 2–3-chotomous; corolla 5-lobed ..... 1. Mitreola.
- Pedicels solitary or clustered; corolla 4-lobed ..... 2. Mitrasacme.

Shrubs or trees.
- Fruit capsular ..... 3. Buddleia.
- Fruit indehiscent.
  - Corolla-lobes contorted ..... 4. Fagræa.
  - Corolla-lobes valvate ..... 5. Strychnos.

1. MITREOLA, Linn.

Herbs. Leaves opposite, membranous; stipules small or reduced to a transverse line. Flowers in terminal or axillary 2–3-chotomous cymes, small, sometimes unilateral on the ultimate cyme-branches. Calyx 5-partite; segments lanceolate. Corolla urceolate; lobes 5, short, valvate. Stamens 5, included in the corolla-tube; filaments short; anthers ovate, cordate at the base, with parallel cells. Ovary 2-celled; ovules many in each cell, attached to a peltate placenta; styles 2, short, connate under a small capitate hairy stigma, free and divergent after flowering. Capsule broad, obovoid, compressed contrary to the septum; carpels at first separating and then dehiscing along the inner face. Seeds small, numerous, subglobose or compressed; albumen fleshy; embryo linear; cotyledons small; radicle terete.—Distrib. Species 4, of which 2 are American and 2 Asiatic.

1. **Mitreola oldenlandioides,** *Wall. Cat.* (1828) 4350. An annual herb 6–18 in. high. Leaves membranous, $1\frac{1}{2}$–3 by $\frac{5}{8}$–$1\frac{1}{4}$ in., oblong, acute or acuminate, glabrous or nearly so, base acute running down into the petiole; main nerves 8–10 pairs with slender reticulate veins between; petioles $\frac{1}{4}$ in. long. Flowers in axillary and terminal dichotomous cymes, secund along the branches; pedicels $\frac{1}{30}$ in. long; bracts lanceolate-subulate, $\frac{1}{16}$ in. long. Calyx $\frac{1}{12}$ in. long, glabrous, divided rather more than $\frac{1}{2}$-way down; segments $\frac{1}{20}$ in. long, subacute. Corolla $\frac{1}{16}$ in. long; lobes 5, about $\frac{1}{3}$ the length of the corolla, acute. Capsule $\frac{1}{6}$–$\frac{1}{5}$ in. long (including the somewhat inturned horns), wedge-shaped, veined. Seeds twice as long as broad, oblong, rounded at the ends, obscurely trigonous, pale, smooth and shining. Fl. B. I. v. 4, p. 79; Dalz. & Gibs. p. 155; Hook. Icon. t. 827; Woodr. in Journ.

Bomb. Nat. v. 12 (1898) p. 168. *Mitreola paniculata*, Wall. Cat. 4349. —Flowers: Aug.-Sept.

KONKAN: *Law*!; Pali, *Kanitkar*!, *Woodrow*; Uran, *Dalzell*!; island of Karanja (Bombay harbor), *Dalzell & Gibson*. KANARA: Kála naddi, *Ritchie*, 1869!—DISTRIB. India (Central Provinces, Birma, Pegu, W. Peninsula); Malaya, N. Australia.

2. **MITRASACME,** Labill.

Low slender herbs. Leaves opposite, entire; petioles united by a very small sheath or by a transverse line. Flowers small, white or yellowish, terminal or axillary, solitary or in fascicles or irregular umbels. Calyx campanulate, 4-fid. Corolla campanulate; lobes 4, valvate. Stamens 4, inserted near the base of the corolla-tube, usually included. Ovary 2-celled; ovules ∞ in each cell, attached to a peltate placenta; styles 2, at first connate, afterwards free at the apex under the capitate or 2-lobed stigma. Capsule subglobose, ovoid or broad, usually compressed contrary to the septum, truncate or 2-horned at the apex; carpels at first separating, then dehiscing down the inner face. Seeds numerous, ovoid or subglobose, usually rugulose; albumen fleshy; embryo straight, subterete.—DISTRIB. India, Japan, New Zealand, Australia; species 28.

1. **Mitrasacme alsinoides,** *R. Br. Prod.* (1810) p. 453. A low nearly glabrous annual 3–6 in. high, having the general appearance of an *Oldenlandia*; stem erect, slender, 2-edged. Leaves $\frac{1}{4}$–$\frac{1}{3}$ by $\frac{1}{16}$–$\frac{1}{8}$ in., sessile, sheathing and connate at the base, oblong or linear, acute, glabrous, veinless. Flowers solitary or 2–3 together, clustered in the upper axils; pedicels $\frac{1}{4}$–$\frac{3}{4}$ in. long, filiform. Calyx $\frac{1}{12}$ in. long, divided $\frac{1}{2}$-way down; segments 4, lanceolate, acute. Corolla white, $\frac{1}{8}$–$\frac{1}{6}$ in. long; lobes 4, shorter than the tube, subobtuse, slightly hairy at the base. Capsule globose, $\frac{1}{10}$ in. in diam., surrounded by the persistent calyx and with 2 falcately curved converging horns at the apex. Seeds minute, subglobose or ellipsoid; testa reticulate. Fl. B. I. v. 4, p. 80; Trim. Fl. Ceyl. v. 3, p. 170. *Mitrasacme pusilla*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 136; Dalz. & Gibs. p. 155. *M. crystallina*, Griff. Notul. v. 4, p. 87. *M. indica*, Wight, Icon. t. 1601.—Flowers: Aug.–Sept.

KONKAN: *Dalzell*!; Malwán, *Dalzell & Gibson*.—DISTRIB. Throughout India; Ceylon, Borneo, Philippines, Australia.

3. **BUDDLEIA,** Linn.

Trees or shrubs often tomentose. Leaves opposite, entire, crenate or toothed, united by a stipular line. Flowers in usually dense globose or corymbiform cymes which are axillary or arranged in a thyrsoid terminal corymbose panicle. Calyx campanulate, 4-lobed. Corolla-tube cylindric or campanulate; lobes 4, short, broad, imbricate, spreading in flower. Stamens 4, inserted on the corolla-tube; anthers subsessile, ovate or oblong. Ovary 2-celled; ovules many in each cell, many-seriate; style filiform, clavate or capitate at the stigmatose tip. Capsule septicidally 2-valved; valves 2-fid or entire. Seeds numerous, oblong or fusiform; testa appressed or laxly reticulate, often expanded into a wing or tail; albumen fleshy; embryo straight.—DISTRIB. Tropical and Subtropical Asia, America, and Africa; species about 70.

1. **Buddleia asiatica,** *Lour. Fl. Cochinch.* (1790) p. 72. A large evergreen shrub, rarely a small tree; young branches tomentose. Leaves 2½–5 by ⅜–1¼ in., lanceolate, acute or acuminate, entire or serrulate, usually glabrous above, covered beneath with a white or yellowish more or less mealy tomentum, base usually acute; petioles 0–¼ in. long. Flowers white, odorous, subsessile, in bracteate tomentose dense usually continuous terminal and axillary spikes which are solitary or several together, sometimes panicled; bracts large, lanceolate, tomentose. Calyx ⅛ in. long, woolly-tomentose, divided about ½-way down; segments ovate, subacute. Corolla ⅓ in. long, tubular, white, hairy outside and in the throat; lobes $\frac{1}{10}$ in. long, obovate, obtuse. Ovary ovoid, glabrous; style clavate. Capsule ⅕ in. long, ovoid or ellipsoid; carpels separating and then dehiscing along the inner face. Seeds minute, not tailed. Fl. B. I. v. 4, p. 82; Dalz. & Gibs. p. 180; Bot. Mag. t. 6323; Bedd. For. Man. in Flor. Sylvat. p. clxiii, t. 21; Talb. Trees, Bomb. ed. 2, p. 240; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 1, p. 546. *Buddleia discolor,* Roth, Nov. Pl. Sp. (1821) p. 83; Wight, Icon. t. 894.—Flowers: Jan.–Apr.

KONKAN: *Stocks*!; hills near Pen, *Dalzell & Gibson.* DECCAN: Fitzgerald Ghát below Mahableshwar, *Cooke*! S. M. COUNTRY: Castlerock, *Kanitkar*!, *Bhiva*! GUJARAT: Dangs, *Bhiva*!—DISTRIB. Throughout India; Malaya, Cochinchina, China.

4. **FAGRÆA,** Thunb.

Glabrous trees or shrubs often epiphytic. Leaves opposite, coriaceous, usually entire; petioles dilated at the base or united by a stipular sheath. Flowers white or yellowish, in bracteate terminal cymes, rarely solitary. Calyx deeply 5-fid or 5-partite; segments thick, broad, imbricate, persistent in fruit. Corolla infundibuliform; lobes 5, twisted and slightly overlapping to the right in bud. Stamens 5; filaments filiform; anthers oblong or ovate with parallel cells. Ovary 2-celled throughout or 1-celled in the upper part; ovules ∞ in each cell; style filiform; stigma capitate. Berry 1–2-celled. Seeds numerous, immersed in pulp; testa crustaceous; albumen horny; embryo small, straight.—DISTRIB. India, Malaya, China, Japan, Australia, Pacific Islands; species 30.

1. **Fagræa obovata,** *Wall. in Roxb. Fl. Ind. ed. Carey,* v. 2 (1824) p. 33. A climbing epiphyte throwing out branched roots like a *Ficus* at intervals on the stem of the host, which is often *Terminalia paniculata* (Talbot); bark smooth, dark-grey, lenticellate. Leaves at the ends of the branches, somewhat fleshy, 4–6 by 2–3 in., obovate-oblong or elliptic, shortly and abruptly acuminate, glabrous above, velvety-tomentose beneath, base narrowed; petioles ¼–½ in. long; stipules often partly free within the petiole, embracing the branch. Flowers white or cream-colored, in 1–5-flowered terminal cymes; peduncles usually 3 together, ½–1 in. long, stout; pedicels very short; bracts ovate. Calyx ⅔ in. long; lobes ⅓ in. long, oblong, obtuse. Corolla 2–3 in. long; tube 1–1¾ in. long, the upper half campanulate; lobes 1–1½ in. long, elliptic, obtuse. Berry 1½ by 1 in., ellipsoid, pointed, glabrous, filled with a fleshy pulp. Seeds about $\frac{1}{10}$ in. in diam., subglobose, slightly pitted. Fl. B. I. v. 4, p. 83; Wall. Cat. (1828) 1595; Bot. Mag.

t. 4205; Trim. Fl. Ceyl. v. 3, p. 171; Talb. Trees, Bomb. ed. 2, p. 241; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 3, p. 312. *Fagræa coromandelliana*, Wight, Icon. t. 1316; Bedd. Flor. Sylvat. t. 244.—Flowers: July. VERN. *Menakalli*; *Hannachalli*.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!, *Talbot*. KANARA: evergreen forests, *Talbot*; Sampkhand (N. Kanara), *Woodrow*!—DISTRIB. India (W. Peninsula, Khasia mountains); Malaya.

5. **STRYCHNOS,** Linn.

Trees or scandent shrubs with short axillary often hooked tendrils. Leaves opposite, usually coriaceous, 3–5-nerved at or a little above the base. Flowers usually white, in terminal or axillary cymes; bracts small. Calyx 5- or 4-partite. Corolla campanulate or hypocrateriform; lobes 5 or 4, valvate. Stamens 5 or 4, inserted in the throat of the corolla; filaments short, filiform; anthers ovate, with distinct parallel cells. Ovary 2-celled throughout, or 1-celled in the upper part; ovules many in each cell; style long or short; stigma capitate or obscurely 2-lobed. Berry usually globose, with a hard rind. Seeds many or 2–1, embedded in a fleshy pulp, variously compressed or, if solitary, globose; albumen horny; embryo short; cotyledons foliaceous; radicle terete, short.—DISTRIB. Tropical and subtropical regions of both hemispheres; species about 100.

Climbing shrubs.	
Upper part of ovary hairy; berry $\frac{2}{3}$ in. in diam., 1–2-seeded.	1. *S. colubrina.*
Ovary wholly glabrous; berry 1–1½ in. in diam., many-seeded	2. *S. Dalzellii.*
Erect trees.	
Fruit orange, 1½–3 in. in diam., usually many-seeded	3. *S. Nux-vomica.*
Fruit black, $\frac{2}{3}$ in. in diam., 1–2-seeded	4. *S. potatorum.*

1. **Strychnos colubrina,** *Linn. Sp. Pl.* (1753) p. 189. A large woody climber; stem often 3 in. in diam. at the base; bark smooth. Tendrils usually single but sometimes in pairs, circinate, thickened upwards. Leaves 3–4½ by 1¼–2 in., elliptic or elliptic-lanceolate, acute, glabrous, shining, strongly 3-nerved from the usually narrowed base; petioles ¼–⅜ in. long. Flowers in small compound axillary puberulous cymes; peduncles very short; pedicels 0–$\frac{1}{10}$ in. long. Calyx $\frac{1}{12}$ in. long, puberulous; segments 5, orbicular-oblong, $\frac{1}{25}$ in. long, with membranous ciliolate margins. Corolla ⅛ in. long, 5-lobed; lobes $\frac{1}{10}$ in. long, oblong, subacute, with a dense fringe of hairs about ½-way down inside. Ovary glabrous below, hairy in the upper part. Berry $\frac{2}{3}$ in. in diam., crustaceous, 1–2-seeded. Seeds ½ in. in diam., discoid. Fl. B. I. v. 4, p. 87; Dalz. & Gibs. p. 155; Trim. Fl. Ceyl. v. 3, p. 173; Talb. Trees, Bomb. ed. 2, p. 241; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 6, part 3, p. 378. *Strychnos bicirrhosa*, Lesch. ex Roxb. Fl. Ind. ed. Carey, v. 2 (1824) p. 267; Grah. Cat. p. 112.—Flowers: Oct.–Jan. VERN. *Kánal*; *Kájrá-vel.*

KONKAN: *Stocks*!, *Law*!, *Dalzell*!; Mira Donger near Pen, *Dalzell & Gibson*; Matheran, *H. M. Birdwood*, *Cooke*! DECCAN: ravines at Khandala, *Graham*; Párghát, *Graham*. S. M. COUNTRY: Chorla Ghát, *Dalzell & Gibson*. KANARA: *Law*!; in the forests of the Tinai Ghát and near Suntgal (Kumpta táluka), *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

The wood which contains strychnia in considerable quantity is used by the Hindus as a tonic in dyspepsia and malarious affections. In Ceylon it has some repute as a remedy in cases of snake-bite. See Watt, Dict. Econ. Prod. l. c.

2. **Strychnos Dalzellii,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 87. A large climber with clavate ferruginous-pubescent tendrils (*Talbot*). Leaves coriaceous, 3–5 by 1½–2¼ in., ovate, acute, glabrous, 3-nerved, base rounded or cuneate; petioles ¼ in. long. Flowers in short dense axillary and terminal subcapitate puberulous cymes; peduncles and pedicels short; bracts ovate, acute, ciliate. Calyx $\frac{1}{12}$ in. long, puberulous outside; segments 5, orbicular-oblong, $\frac{1}{25}$ in. long, hairy at the base inside and with ciliate margins. Corolla ⅛ in. long, 5-lobed; lobes $\frac{1}{10}$ in. long, thick, oblong, subacute, with a dense transverse fringe of white hairs about ½-way down the inner face. Stamens 5; filaments short; anthers deltoid-ovate, cordate, the lobes slightly bearded at the base. Ovary ovoid, quite glabrous, tapering into the style. Berry 1–1½ in. in diam., crustaceous, many-seeded. Seeds ⅓ in. in diam., discoid. Talb. Trees, Bomb. ed. 2, p. 241; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168. *Strychnos axillaris*, Dalz. & Gibs. Bo. Fl. p. 155 *in adn.* (*not* of Colebr.). *S. colubrina*, Grah. Cat. p. 112 (*not* of Linn.).

Konkan: N. & S. Konkan, *Law*!; southern Ghâts, *Dalzell & Gibson*. Kanara: Supa Ghâts, *Ritchie*, 1867!—Distrib. India (W. Peninsula).

3. **Strychnos Nux-vomica,** *Linn. Sp. Pl.* (1753) p. 189. A deciduous tree sometimes reaching 100 ft. in height (*Talbot*), often with short sharp strong axillary spines; bark thin, grey, smooth or rough with lenticels. Leaves 3–6 by 1¾–3 in., broadly elliptic, acute, obtuse, or shortly acuminate, glabrous and shining, 5-nerved (the lateral pair often faint), base usually rounded; petioles ¼–½ in. long. Flowers numerous, greenish-white, in terminal pedunculate pubescent compound cymes; peduncles and pedicels short, pubescent. Calyx $\frac{1}{10}$ in. long, pubescent outside; segments 5, lanceolate, acute, $\frac{1}{16}$ in. long. Corolla a little less than ½ in. long, 5-lobed, glabrous or nearly so outside; tube cylindric, hairy inside below, the throat glabrous; lobes ⅙ in. long, narrowly oblong, acute. Ovary and style glabrous. Fruit globose, 1–3 in. in diam., slightly rough but shining, orange-red when ripe. Seeds usually many, discoid, about ¾ in. in diam., much compressed, concave on one side and convex on the other, clothed on both sides with very fine appressed grey silky hairs radiating from the centre; cotyledons cordate. Fl. B. I. v. 4, p. 90; Grah. Cat. p. 112; Dalz. & Gibs. p. 155; Bedd. Flor. Sylvat. t. 243; Trim. Fl. Ceyl. v. 3, p. 175; Talb. Trees, Bomb. ed. 2, p. 241; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 6, part 3, p. 379.—Flowers: Mar.–Apr. Vern. *Kájrá*; *Kásarkanamara*.

Konkan: hilly parts, *Graham*; Goa jungles, *Dalzell*!, Ratnagiri, *Woodrow*; Wari country, common, *Dalzell & Gibson*. S. M. Country: Badami, *Cooke*! Kanara: common on the laterite along the sea-coast, *Talbot*; Kála naddi, *Ritchie*, 90!—Distrib. More or less throughout Tropical India.

Strychnine is obtained from the seeds, of which large quantities are exported from India, the Bombay product being considered the best. Although the pulp of the fruit contains a small quantity of strychnine, it is eaten voraciously by birds and also by the natives in some localities. See Watt, Dict. Econ. Prod. l. c.

4. **Strychnos potatorum,** *Linn. f. Suppl.* (1781) p. 148. A moderate-sized glabrous tree attaining 40 ft.; bark black, cracked and scaly; trunk often irregularly fluted. Leaves 2–3 by 1–1¾ in., nearly sessile, subcoriaceous, ovate or elliptic, acute or subacuminate, glabrous and shining, spuriously 3- or 5-nerved (the lateral nerves springing from the lower part of the midrib not far from its base), base rounded or acute; petioles $\frac{1}{10}$ in. long. Flowers rather large for the genus, in short almost glabrous nearly sessile axillary cymes; peduncles 0–$\frac{1}{5}$ in. long; pedicels very short. Calyx $\frac{1}{12}$ in. long, glabrous; segments 5, ovate, acute, $\frac{1}{20}$ in. long. Corolla $\frac{1}{6}$–$\frac{1}{4}$ in. long, 5-lobed; lobes $\frac{1}{10}$ in. long, oblong, acute, with a tuft of hair inside towards the base of each lobe. Ovary ovoid, glabrous, tapering into a long glabrous style; stigma obscurely 2-lobed. Berry black when ripe, $\frac{2}{3}$ in. in diam. Seeds 1 or 2, circular, $\frac{1}{3}$ in. in diam., bluntly lenticular, not greatly compressed (in shape like a cheddar cheese), shining with short appressed silky hairs, yellow. Fl. B. I. v. 4, p. 90; Grah. Cat. p. 112; Dalz. & Gibs. p. 156; Wight, Ill. t. 156; Bedd. For. Man. in Flor. Sylvat. p. clxiii; Trim. Fl. Ceyl. v. 3, p. 176; Talb. Trees, Bomb. ed. 2, p. 242; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 163; Watt, Dict. Econ. Prod. v. 6, part 3, p. 382.—Flowers: Apr.–May. VERN. *Nirmali.*

KONKAN: Matheran near Hart Point, *H. M. Birdwood.* DECCAN: Pál jungles (Khandesh districts), *Kanitkar!* S. M. COUNTRY: Belgaum districts, *Talbot*; hills north of Belgaum, *Ritchie,* 1119! KANARA: *Law!*; banks of the Kála naddi, *Law* ex *Graham.*—DISTRIB. India (Birma, Central India, W. Peninsula); Ceylon.

The ripe seeds known as *clearing nuts* are employed by the natives for clearing muddy water. The cut seeds are rubbed on the inside of a rough earthen vessel, which is then filled with water and, on standing, most of the impurities subside so that the water becomes drinkable. See Watt, Dict. Econ. Prod. l. c.

ORDER LXXXV. GENTIANACEÆ.

Annual or perennial bitter usually glabrous herbs (rarely shrubs). Leaves opposite (alternate in *Limnanthemum*); stipules 0. Flowers usually regular and hermaphrodite, in terminal cymes or clusters, or axillary and clustered or solitary. Calyx inferior, 4–5-lobed or -partite; lobes usually imbricate. Corolla gamopetalous; tube campanulate, infundibuliform or cylindric; lobes usually 4–5, contorted, imbricate or induplicate-valvate. Stamens as many as the corolla-lobes, inserted in the corolla-tube or at its mouth; filaments filiform or dilated at the base; anthers dehiscing longitudinally, less commonly by apical pores or short slits. Disk annular, or of 5 glands at the base of the ovary or 0. Ovary superior, 2-carpellary, 1-2-celled; ovules usually many in each cell; style simple; stigma entire or 2-lobed. Fruit usually capsular and dehiscent, septicidally 2-valved. Seeds usually sessile, sometimes winged; *albumen copious*; *testa* membranous or crustaceous; embryo small.—DISTRIB. Temperate regions of both hemispheres, abundant; in the Tropics rare except on the mountains; genera about 50; species 500–600.

Terrestrial herbs; leaves opposite; corolla-lobes contorted in bud.
Ovary 2-celled..... ..... 1. EXACUM.

Ovary 1-celled.
Corolla-lobes without pits, depressions, or glands at the base.
Corolla regular.
Flowers in sessile axillary clusters ..... 2. ENICOSTEMMA.
Flowers in dichotomous cymes..... 3. ERYTHRÆA.
Corolla irregular.
Stigma scarcely lobed; flowers yellow ..... 4. HOPPEA.
Stigma deeply 2-lobed; flowers pink or white. 5. CANSCORA.
Corolla-lobes with 1 or 2 pits, depressions, or glands at the base ..... 6. SWERTIA.
Aquatic herbs; leaves alternate; corolla-lobes induplicate-valvate in bud..... 7 LIMNÀNTHEMUM.

1. EXACUM, Linn.

Annual herbs. Leaves opposite, entire. Flowers in terminal and axillary usually dichotomous cymes. Calyx deeply 4–5-lobed; lobes keeled, winged or flat. Corolla blue, purple, or white; tube short, globose; lobes 4–5, ovate or oblong. Stamens 4–5 on the corolla-throat; filaments short, dilated at the base; anthers dehiscing by terminal pores at length extending into lateral slits. Ovary 2-celled; ovules many in each cell; style long; stigma capitate. Capsule globose, septicidally 2-valved. Seeds many, minute, reticulate.—DISTRIB. Chiefly Indian; a few species Malayan, Chinese, and African; species 20.

Corolla-lobes 1 in. or more long ..... 1. *E. bicolor.*
Corolla-lobes less than ½ in long.
Calyx-lobes winged on the back.
Pedicels stout, rigid; corolla-lobes lanceolate, acute..... 2. *E. pedunculatum.*
Pedicels filiform; corolla-lobes suborbicular, obtuse..... 3. *E. pumilum.*
Calyx-lobes not winged on the back..... 4. *E. Lawii.*

1. **Exacum bicolor,** *Roxb. Hort. Beng.* (1814) p. 83. Annual, erect, reaching 2 ft. high; root fibrous; stem quadrangular, scarcely branched. Leaves very variable in size and form, sessile, 1½–5 by ¾–2 in., ovate or elliptic or lanceolate, acute or obtuse, sometimes apiculate, 5-nerved, glabrous. Flowers showy, in copious terminal glabrous cymes; pedicels ¼–¾ in. long; bracts lanceolate, acute. Calyx ½ in. long, glabrous, deeply 4-partite; segments ovate, suddenly aristate-acuminate and with membranous margins, the keel furnished with a large veined wing which is more or less decurrent on the pedicel. Corolla reaching 1¼ in. long (when expanded 2 in. and more across); lobes reaching 1 in. or more long, obliquely obovate, acute, the lower half white, the upper blue. Anthers ⅓–½ in. long, curved. Style ⅝–¾ in. long. Capsule ½ in. long, ellipsoid, smooth and shining, tipped with the remains of the style, yellowish-brown. Fl. B. I. v. 4, p. 96; Grah. Cat. p. 123; Dalz. & Gibs. p. 156; Wight, Icon. t. 1321; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 6, p. 306. *Exacum tetragonum*, var. *β. bicolor*, Bot. Mag. (1847) t. 4340. *Sebœa carinata*, Grah. Cat. p. 124 (*not* of Spreng.).—Flowers: Aug.–Nov. VERN. *Udichirâyet.*

KONKAN: pasture-lands between Panwel and Khandala, *Graham*; Salsette, *Graham.* DECCAN: hills, *Woodrow*!; Mâwal (Poona districts), *Woodrow*!; Kadkala, *Cooke*!; Khandala, *Graham*; Wadgaon, *Kanitkar*! S. M. COUNTRY: Belgaum, *Cooke*, *Ritchie*, 458!; Castlerock, *Cooke*!—DISTRIB. India (W. Peninsula).

The dried stalks are sold in the market in S. India. An infusion of the dried stalks affords a good bitter and may be used as a substitute for gentian. See Watt, Dict. Econ. Prod. l. c.

2. **Exacum pedunculatum,** *Linn. Sp. Pl.* (1753) p. 112. Annual, erect, 3–18 in. high; stem quadrangular, much-branched above. Leaves subsessile (distinctly petiolate in var. *petiolare*), 1¼–2 by ⅜–½ in., elliptic or lanceolate, 3- or 5-nerved, glabrous, base usually tapering. Flowers in terminal much-branched cymes; peduncles and pedicels long, rigid; bracts lanceolate. Calyx ⅕–¼ in. long, 4-lobed, thinly membranous; lobes ⅛–⅙ in. long, lanceolate, furnished with a large almost semicircular strongly nerved wing which is rounded and often subauricled at the base, more or less decurrent into the pedicel, produced at the apex into a fine point which is fused with the apex of the sepal so as to form a mucro. Corolla blue, ¼–½ in. long; lobes 4, lanceolate, acute, ⅙–⅓ in. long. Stamens on the corolla-throat; filaments 1/30–1/15 in. long; anthers 1/10–⅙ in. long, oblong (not tapering), cordate at the base. Capsule globose, ⅙ in. in diam., smooth, shining. Fl. B. I. v. 4, p. 97; Trim. Fl. Ceyl. v. 3, p. 182; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168; Watt, Dict. Econ. Prod. v. 3, p. 306. *Exacum pedunculare*, Arn. in Ann. Sc. Nat. sér. 2, v. 11 (1839) p. 176; Wight, Icon. t. 336.—Flowers: Dec.

Deccan: *Dalzell*!; Kelgaon, 14 miles north of Poona, *Bhiva*! S. M. Country: Belgaum, common near brooks, *Ritchie*, 459! Kanara: Yellur, *Ritchie*, 459! Gujarat: Surat, *Kanitkar*!—Distrib. Throughout India; Ceylon.

Var. *petiolare*, Trim. Fl. Ceyl. v. 3, p. 182. Leaves distinctly petiolate, broader, 5-nerved. Griesb. in DC. Prod. v. 9, p. 46 (sp.); C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 98; Wight, Icon. t. 1324; Dalz. & Gibs. p. 157; Trim. in Journ. Bot. v. 27 (1889) p. 164; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168.

Konkan: island of Karanja, *Dalzell & Gibson*; Matheran, *H. M. Birdwood, Cooke*!, *Kanitkar*! S. M. Country: Londa, *Cooke*!—Distrib. India (W. Peninsula); Ceylon.

I have followed Trimen in reducing this to a variety. The only difference appears to be that the leaves are better developed and have longer petioles, which might perhaps be the effect of soil and situation.

3. **Exacum pumilum,** *Griesb. in DC. Prodr.* v. 9 (1845) p. 46. Herbaceous, erect, 4–9 in. high; stems tetragonal. Leaves thin, sessile, those near the base of the stem abbreviated, sometimes scarcely ⅛ in. long, linear, acute, 1-nerved, the upper leaves ½–¾ by ⅙–¼ in., lanceolate subobtuse, 3-nerved, attenuated towards the base. Flowers in lax cymes, bluish-purple; peduncles slender, long; pedicels filiform, sometimes reaching ¾ in. long. Calyx ⅛–⅙ in. long, thinly membranous; lobes 4, ovate, acute, 1/10 in. long, the keels with rounded veined wings obtuse at the base and produced to a point at the apex, there fusing with the acute apex of the calyx-lobes. Corolla ⅓ in. long; lobes ¼ by ⅕–¼ in., broadly elliptic or suborbicular, obtuse. Anthers oblong, straight. Capsule subglobose or ovoid, ⅛ in. in diam. Fl. B. I. v. 4, p. 98; Dalz. & Gibs. p. 157; Wight, Icon. t. 1324.—Flowers: Aug.–Sept.

Pretty common in grass during the rains. Konkan: *Law*!, *Dalzell*!; Uran (in Bombay harbor), *Dalzell*! S. M. Country: Belgaum, *Ritchie*, 463!—Distrib. India (W. Peninsula).

Griesbach (*l. c.*) is in error when he describes the calyx as wingless. The plant may perhaps be a slender form of *E. pedunculatum*, to which it is very closely allied.

4. **Exacum Lawii,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 98. A small erect herb 2–5 (rarely reaching 6) in. high. Stem slender, quadrangular, usually simple, but sometimes slightly branched near the top. Leaves sessile, small, $\frac{1}{4}$ in. long or less, often as broad as long, ovate, acute or subobtuse, thick, usually 3 (sometimes 5) -nerved, glandular-punctate. Peduncles terminal, quadrangular, $\frac{1}{2}$–2 in. long, usually 1-flowered. Calyx $\frac{1}{6}$ in. long, 4-partite; segments $\frac{1}{8}$ in. long, broadly ovate, acute, pellucido-punctate, nerved, the midrib very strong. Corolla bluish-purple, $\frac{1}{4}$–$\frac{1}{3}$ in. long; lobes broadly obovate. Filaments $\frac{1}{16}$ in. long, filiform; anthers yellow, $\frac{1}{20}$ in. long, oblong, not tapering, about $\frac{1}{2}$ as broad as long. Capsule subglobose or ovoid, $\frac{1}{8}$ in. in diam. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168.—Flowers: Oct.

Deccan: Mahableshwar, common, *Cooke*!, *Woodrow*!, *H. M. Birdwood*. S. M. Country: Cheeta hill, Belgaum, *Ritchie*, 462!—Distrib. Hills of the Western Peninsula of India; Ceylon (?).

Trimen (Fl. Ceyl. v. 3, p. 183 *in adnot.*) apparently considers this to be a dwarf uniflorous state (confined to the hills) of *E. sessile*, which is a common plant in Ceylon, and further states that the flowers of *E. sessile*, which have been differently described as yellow and white, are really (at all events in Ceylon) purple.

2. **ENICOSTEMMA,** Blume.

Erect or procumbent herbs. Leaves numerous, opposite. Flowers small, in axillary clusters. Calyx-tube campanulate; lobes 5, oblong or lanceolate. Corolla-tube long, the lower half cylindric, the upper half narrowly infundibuliform; lobes 5, small. Stamens 5, inserted at the middle of the corolla-tube; filaments filiform with a small double-hooded scale at the base; anthers erect, not twisted, acute. Ovary 1-celled; placentas little intruded; ovules many; style short; stigma capitate. Capsule ellipsoid, septicidally 2-valved. Seeds many, globose, foveolate. —Distrib. Species 4; 1 in Madagascar, 1 in Tropical America, 2 in Tropical Africa, of which 1 also occurs in Asia.

1. **Enicostemma littorale,** *Blume, Bijdr.* (1826) p. 848. A perennial glabrous herb 4–20 in. high, branched from the base; stems erect or procumbent, subquadrangular or subterete, glabrous. Leaves sessile, variable, $1\frac{1}{4}$–$2\frac{1}{2}$ by $\frac{1}{8}$–$\frac{5}{8}$ in., linear or linear-oblong or elliptic-oblong or lanceolate, obtuse or acute, glabrous, 3-nerved, the midnerve strong, the marginal nerves often obscure. Flowers sessile, in axillary clusters all along the stem. Calyx $\frac{1}{5}$ in. long; lobes $\frac{1}{16}$ in. long, ovate-oblong, obtuse, with narrow membranous margins. Corolla white, $\frac{1}{4}$–$\frac{1}{3}$ in. long, tubular; lobes $\frac{1}{10}$ in. long, lanceolate, acute. Capsule $\frac{1}{6}$ in. long, ellipsoid, slightly narrowed at the base, rounded at the apex, apiculate with the remains of the style. Fl. B. I. v. 4, p. 101; Trim. Fl. Ceyl. v. 3, p. 185; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prod. v. 3, p. 245. *Slevogtia maritima*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 137. *Adenema hyssopifolium*, G. Don, Syst. v. 4 (1837) p. 201; Wight, Icon. t. 600. *Hippion orientale*, Dalz. & Gibs. p. 157.—Flowers: Aug.–Nov. Vern. *Chota-Karáit.*

Konkan: *Stocks*!, *Dalzell*!; Malwán, *Dalzell*. S. M. Country: Dharwar, *Woodrow*; Badami, *Cooke*!; Padshapur, *Ritchie*, 1879! Gujarat: Porbandar (Kathiawar), *Cooke*!; Ankleshwar, *Kanitkar*!; Nadiad, *Bhat*! Sind: *Bhola Puran*!—Distrib.

Throughout the greater part of India, more frequent near the sea, but not known in Bengal; Ceylon, Malaya, Tropical Africa, W. Indies.

An infusion of the plant is used as a bitter tonic; it is brought in considerable quantity to Bombay from Gujarat. See Watt, Dict. Econ. Prod. l. c.

3. **ERYTHRÆA,** Renealm.

Annual or perennial erect branched herbs. Leaves opposite, sessile. Flowers rosy or white, in dichotomous often corymbose cymes. Calyx shortly or deeply 5 (rarely 4) -cleft; lobes keeled. Corolla-tube long or short; lobes 5 (rarely 4), spreading. Stamens 5 (rarely 4), inserted on the corolla-tube; filaments short; anthers usually exserted, erect, linear-oblong, often spirally twisted. Ovary 1-celled, the placentas however often much intruded; ovules many; style filiform; stigma 2-lobed. Capsule oblong, 1- or almost 2-celled, 2-valved, many-seeded. Seeds minute, foveolate.—DISTRIB. Chiefly in temperate and subtropical regions of the northern hemisphere, rare in the Tropics, 1 species extending to Chili and another to Australia; species about 20.

1. **Erythræa Roxburghii,** *G. Don, Gen. Syst.* v. 4 (1837) p. 206. A small erect herbaceous plant 2–8 in. high. Radical leaves rosulate, persistent, $\frac{3}{4}$–1 by $\frac{1}{8}$–$\frac{1}{4}$ in., obovate or oblong, obtuse. Cauline leaves smaller, linear-oblong. Flowers in dichotomous cymes with a flower in each fork on a pedicel $\frac{1}{4}$–$\frac{1}{2}$ in. long. Calyx $\frac{1}{3}$ in. long; segments $\frac{1}{5}$ in. long, linear-subulate. Corolla $\frac{1}{2}$-$\frac{5}{8}$ in. long; tube $\frac{1}{3}$ in. long; lobes pink, $\frac{1}{5}$ in. long, elliptic, acute, spreading star-like (*Dalzell*). Anthers twisted at the apex. Stigma large, 2-lobed. Capsule exceeding $\frac{1}{3}$ in. long, narrowly oblong. Fl. B. I. v. 4, p. 102; Dalz. & Gibs. p. 157; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prod. v. 3, p. 268.—Flowers: Feb.–Apr. VERN. *Luntak.*

Tolerably common in cultivated fields. KONKAN: *Stocks!, Law!*; Pen, *Kanitkar!* DECCAN: *Woodrow*; Kolhapur, *Cooke!* S. M. COUNTRY: Belgaum, *Ritchie,* 1878!—DISTRIB. Throughout India.

The whole plant is very bitter, and is used as a substitute for chiretta. See Watt, Dict. Econ. Prod. l. c.

4. **HOPPEA,** Willd.

Small much-branched glabrous herbs. Leaves opposite, small, sessile. Flowers shortly pedicellate or sessile, small, in 2–3-chotomous cymes. Calyx campanulate, membranous; lobes 4, lanceolate. Corolla tubular; lobes 4, more or less unequal. Stamens inserted in the throat of the corolla, 1 perfect, 3 barren; filaments short, filiform; anthers small, ovate, erect, with parallel cells. Ovary 1-celled, placentas little intruded; style short; stigma subentire. Capsule globose or ellipsoid, septicidally 2-valved. Seeds numerous, minute, obscurely reticulate.—DISTRIB. East India and Ceylon; species 2.

1. **Hoppea dichotoma,** *Willd. in Ges. Naturf. Fr. Neue Schr.* v. 3 (1801) p. 434. A small divaricately branched herb 2–5 in. high; stem and branches quadrangular, more or less winged. Leaves $\frac{1}{4}$ by $\frac{1}{8}$ in., ovate, acute. Cymes dense or lax; pedicels short; bracts lanceolate. Calyx campanulate, $\frac{1}{10}$–$\frac{1}{8}$ in. long, membranous; lobes $\frac{1}{16}$ in. long, overtopping the corolla, lanceolate, very acute, with a strong green nerve at each margin. Corolla tubular, $\frac{1}{12}$ in. long, pale-yellow; lobes $\frac{1}{2}$ as long as the tube, ovate-oblong, obtuse. Anthers, 1 fertile, 3 barren.

Capsule ellipsoid, $\frac{1}{12}$ in. long. Fl. B. I. v. 4, p. 100. *Hoppea fastigiata*, Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 168 (*not* of C. B. Clarke). *Pladera pusilla*, Roxb. Fl. Ind. ed. Carey, v. 1, p. 419; Griesb. in DC. Prodr. v. 9, p. 63.—Flowers: Oct.

KONKAN: Uran (Bombay harbor), *Stocks*! DECCAN: Ganesh Khind near Poona, *Woodrow*!; Jinsi near Raver (Khandesh), *Kanitkar*! S. M. COUNTRY: Belgaum in grass land, *Ritchie*, 1877!—DISTRIB. Throughout India.

5. **CANSCORA,** Lamk.

Much-branched erect annuals. Leaves opposite, sessile, petiolate or perfoliate. Flowers pink or white, in lax terminal cymes. Calyx tubular, 4-toothed; tube terete, ribbed or winged. Corolla-tube cylindric; lobes 4, more or less unsymmetric, imbricate in bud. Stamens 4, inserted at different heights on the corolla-tube, 1 (rarely 2) with longer filaments and larger and fertile anthers and inserted higher up than the others, which are usually barren; filaments short; anthers ovate or oblong. Ovary 1-celled; placentas slightly intruded; ovules many; style filiform; stigma deeply 2-lobed. Capsule cylindric, membranous, septicidally 2-valved. Seeds reticulato-rugose.—DISTRIB. East Indies, Malaya, Australia, Tropical Africa; species 14.

Calyx not winged.	
Stems obtusely quadrangular, not or obsoletely winged	1. *C. diffusa.*
Stems strongly 4-winged.	
Lower leaves exceeding 1 in. long; corolla-limb shorter than the tube	2. *C. decurrens.*
Lower leaves less than 1 in. long; corolla-limb equalling the tube	3. *C. pauciflora.*
Calyx strongly 4-winged.	
Herb 3–5 in. high; bracts small, linear-lanceolate	4. *C. concanensis.*
Herb 6–20 in. high; bracts large, circular, perfoliate	5. *C. perfoliata.*

1. **Canscora diffusa,** *R. Br. Prodr.* (1810) p. 451 *in Obs.* A much-branched slender erect annual 6–24 in. high (occasionally under favorable conditions of growth reaching 4 ft. high); stems obtusely quadrangular, obscurely winged. Leaves membranous, 3-nerved, reticulately veined, the upper $\frac{3}{8}$–$\frac{5}{8}$ by $\frac{1}{4}$–$\frac{3}{8}$ in., broadly ovate, acute, apiculate, rounded at the base, sessile, the lower 1–1$\frac{1}{2}$ by $\frac{1}{2}$–$\frac{5}{8}$ in., elliptic, acute, much narrowed at the base, petiolate. Flowers numerous, in lax diffuse paniculate cymes; pedicels filiform, $\frac{1}{4}$–$\frac{1}{2}$ in. long or even longer; bracts linear-subulate. Calyx $\frac{1}{4}$ in. long, not winged; teeth 4, lanceolate, acute, $\frac{1}{10}$ in. long. Corolla $\frac{1}{2}$ in. long; tube $\frac{1}{4}$ *in. long, green; limb* rosy, with a darker ring edged with white in the throat, 4-cleft, one of the divisions much less deep than the others; lobes unequal, ovate, obtuse. Stamens 4, one longer than the other three, which are equal, the long stamen inserted higher up than the others. Capsule membranous, $\frac{1}{5}$ in. long, narrowly oblong. Fl. B. I. v. 4, p. 103; Grah. Cat. p. 123; Dalz. & Gibs. p. 158; Trim. Fl. Ceyl. v. 3, p. 184; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prod. v. 2, p. 128. *C. Lawii*, Wight, Icon. t. 1327 (*not* of C. B. Clarke).—Flowers: Oct.–Jan.

KONKAN: *Stocks*!, *Dalzell & Gibson*; Matheran, growing 3–4 ft. high in the Rámbág, *H. M. Birdwood.* DECCAN: Sinhagad near Poona, *Bhiva*!; Mahableshwar, *Graham, Cooke*!, *H. M. Birdwood.* S. M. COUNTRY: Dharwar, *Ritchie*, 466! KANARA: Kála naddi, *Ritchie*, 1274! GUJARAT: Surat, *Kanitkar*!—DISTRIB. Throughout India; Ceylon, Malaya, Australia, Tropical Africa.

2. **Canscora decurrens,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 136. A slender erect herb 1–1½ ft. high; stem 4-winged; branches opposite and alternate. Leaves sessile, thin, membranous, 3-nerved, decurrent along the stem for the whole length of the internode; the lower leaves reaching sometimes 2 in. by ½–1 in., oblong, attenuated towards the base; the upper leaves much smaller than the lower, ovate or lanceolate, acute. Flowers in subtrichotomous cymes; pedicels 4-gonous, ½ in. long. Calyx not winged, ⅕ in. long; teeth $\frac{1}{2\cdot5}$ in. long, lanceolate, acute, with a broad sinus. Corolla pale rose-colored or sometimes white (*Dalzell*), rather more than ¼ in. long; tube ⅕ in. long; lobes shorter than the tube, oblong, obtuse. Stigma 2-lobed, the lobes large, ovate, obtuse. Fl. B. I. v. 4, p. 103; Dalz. & Gibs. p. 157; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169.—Flowers: Oct.-Dec.

KONKAN: *Stocks*!; rice-fields in the S. Konkan, *Dalzell*! DECCAN: Poona, *Woodrow*! KANARA: Kumpta, *Woodrow*; Kála naddi, *Ritchie*, 1120!—DISTRIB. India (W. Peninsula).

3. **Canscora pauciflora,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 136. Stem erect, 4-winged. Leaves sessile, 3-nerved, rough on the margin alone; lower leaves ⅓–½ by $\frac{1}{6}$–¼ in., ovate or obovate, obtuse; upper leaves smaller, oblong, acute. Flowers in lax dichotomous cymes; pedicels 4-winged, sometimes reaching 1 in. long, thickened at the apex; bracts small, linear, acute. Calyx ¼ in. long, 12-ribbed, the ribs in threes running out to the tips of the calyx-teeth; calyx-teeth $\frac{1}{16}$ in. long, lanceolate, acute. Corolla ⅜ in. long; lobes equalling the tube, oblong, obtuse. Style exserted. Fl. B. I. v. 4, p. 103; Dalz. & Gibs. p. 157. *Canscora Lawii*, C. B. Clarke, in Journ. Linn. Soc. v. 14 (1875) p. 430 (*not* of Wight).—Flowers: Sept.

KONKAN: *Stocks*!, *Dalzell*!; Malwán in grassy places, *Dalzell*!, *Ritchie* (without locality), 1875!—DISTRIB. India (W. Peninsula).

4. **Canscora concanensis,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 104. A small slender annual 3–5 in. high; stem decumbent, then erect, obscurely quadrangular. Leaves ½–⅞ by ¼–½ in., ovate, subacute, sessile, 3-nerved. Flowers in weak terminal paniculate cymes at first dichotomous, the branches upwards subunilateral; pedicels filiform, ⅛–¼ in. long; bracts small, linear-lanceolate. Calyx ⅓ in. long; teeth about $\frac{1}{16}$ in. long, deltoid, acute; wings $\frac{1}{16}$-⅛ in. broad, semi-elliptic, membranous, prominently reticulately veined. Corolla ¾ in. long; lobes ⅛–⅙ in. long, obovate, obtuse.

A very distinct species, of which there is but a single sheet in Herb. Kew. ticketed "Konkan, *Law*!"—DISTRIB. Apparently endemic.

5. **Canscora perfoliata,** *Lamk. Encyc. Méthod.* (1783) v. 1, p. 601. An erect annual 6–20 in. high; stem 4-winged. Leaves of the stem ¾–1¼ by $\frac{1}{6}$–⅜ in., oblong-lanceolate, acute or acuminate, sessile, 3-nerved, those of the branches perfoliate, circular, ¼–½ in. in diam., bract-like, 2-mucronate. Flowers in paniculate terminal cymes, usually in threes, but sometimes reduced to a single flower, each division of the cyme supported by a circular perfoliate bract ¼–½ in. in diam.; pedicels very short, sometimes almost 0. Calyx ½–⅝ in. long, with 4 broad membranous reticulately veined semi-elliptic wings about ⅛ in. broad in the widest part; lobes ⅙ in. long, acute or acuminate. Corolla reaching

¾ in. long; limb as long as the tube; lobes obovate, obtuse, rose-colored. Capsule ⅓–½ in. long. Fl. B. I. v. 4, p. 104; Grah. Cat. p. 123; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169. *Canscora alata*, Wall. Cat. 4363 A; Dalz. & Gibs. p. 158. *C. grandiflora*, Wight, Icon. t. 1326.—Flowers: Feb.

KONKAN: *Law*!, *Gibson*!; Vingorla, *Dalzell*!; Salsette and Uran, *Graham*; Marmagao, *Kanitkar*! KANARA: Hulikal, *Woodrow*!; Karwar, *Woodrow*; Kála naddi, *Ritchie*, 464!—DISTRIB. India (W. Peninsula).

6. **SWERTIA,** Linn.

Annual or perennial herbs. Leaves opposite. Flowers blue, lurid, or white, sometimes with yellow nectaries, in terminal corymbose or paniculate cymes. Calyx deeply 4–5-partite; tube 0 or very short; segments acute or obtuse. Corolla subrotate; tube very short, broad; lobes 4–5, acute or obtuse, with 1 or a pair of glandular nectaries at the base. Stamens 4–5, inserted at the base of the corolla and shorter than its lobes; filaments subulate or flattened; anthers oblong, versatile. Ovary 1-celled; placentas slightly intruded; ovules many; style short or 0; stigma 2-lobed. Capsule ovoid or oblong, 2-valved. Seeds many, minute, compressed, often winged.—DISTRIB. Europe, Asia, and Africa, principally in the mountains; species about 90.

Nectaries 2 at the base of each petal; small herb under 10 in. high	1. *S. minor.*
Nectary 1 at the base of each petal; herbs exceeding 10 in high.	
Nectary without a covering scale	2. *S. decussata.*
Nectary with a fimbriate covering scale	3. *S. corymbosa* var. *Lawii.*

1. **Swertia minor,** *T. Cooke.* A small erect herb 2–9 in. high; stem conspicuously 4-winged, not branched near the base. Leaves sessile, ½–¾ by ¼–½ in., ovate, acute, obscurely 3-nerved. Flowers 4-merous, in leafy paniculate cymes; pedicels ⅛–1 in. long. Calyx divided almost to the base, somewhat enlarged in fruit; segments 4, ovate, acute, ⅛–⅙ in. long. Corolla ¼ in. long; tube very short, scarcely $\frac{1}{30}$ in. long; lobes 4, ovate-oblong, acute, with 5 parallel nerves, each lobe with 2 triangular pockets near the base, the upper margin of the covering scale fimbriate. Filaments ⅛ in. long, flattened; anthers versatile. Capsule ⅕–¼ in. long, ovoid. Seeds suborbicular, compressed, not winged. *Ophelia minor*, Griesb. in DC. Prodr. v. 9 (1845) p. 126; Wight, Icon. t. 1332; Dalz. & Gibs. p. 156. *Pleurogyne minor*, Benth. in Gen. Pl. v. 2, p. 816; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 120.—Flowers: Aug.–Sept.

KONKAN: wet springy ground on the highest Ghâts opposite Bombay, *Dalzell & Gibson.* DECCAN: Khandala, *Bhiva*!; Khadkala, *Kanitkar*!; Panchgani, *Cooke*! S. M. COUNTRY: Belgaum, on hill tops, *Ritchie*, 317!—DISTRIB. India (hills of the W. Peninsula).

I have carefully examined several specimens of this plant in the dried state and have found the glands at the base of the petals to be as described above, although, in one or two cases of plants in fruit, the glands were hardly distinguishable. Griesbach remarks that in Hügel's collection the glands were covered by a laciniate scale, while in Perottet's specimens the glands were naked and very minute. Mr. C. B. Clarke (Fl. B. I. l. c.) is doubtful as to the propriety of placing the plant in the genus *Pleurogyne*, and I think it should certainly be restored to its pristine position.

2. **Swertia decussata,** *Nimmo, ex Grah. Cat. Pl. Bomb.* (1839) p. 249. Stem erect, 1–3 ft. high, densely leafy, obtusely quadrangular, more or less 4-winged. Leaves sessile, numerous, approximate, decussate, ¾–1¼ by ½–1 in., broadly ovate, obtuse, sometimes shortly apiculate, 5 (less commonly 3) -nerved. Flowers very numerous, in dense corymbose cymes; pedicels $\frac{1}{10}$–½ in. long; bracts foliaceous, lanceolate, 3-nerved. Calyx ⅓ in. long, tube about $\frac{1}{20}$ in. long; lobes lanceolate, acute, with a strong midnerve. Corolla white with blue veins; tube scarcely $\frac{1}{20}$ in. long; lobes ⅓ by ⅕ in., broadly ovate, shortly acuminate, with a yellow circular pit at the base fringed all round with rather long scaly fimbriæ but without a covering scale. Filaments ⅛ in. long, dilated and connate at the base, flattened; anthers $\frac{1}{16}$ in. long, oblong. Fl. B. I. v. 4, p. 127; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prodr. v. 6, part 3, p. 392. *Ophelia multiflora*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 135; Dalz. & Gibs. p. 156. *Ophelia alba*, Wight, Ill. t. 157 bis, fig. 3, *f.*—Flowers: Oct.-Jan. VERN. *Kadu*; *Kavadi.*

Western Ghâts, *Dalzell*!, *Woodrow*! DECCAN: Mahableshwar, *Cooke*!, *Ralph*!, *Wight*!; Panchgani, *Woodrow*!, abundant on the Table Rock above the Traveller's Bungalow, *Cooke*!—DISTRIB. India (W. Peninsula).

The whole plant is bitter, but the roots are considered to be the most valuable part, and are sold in the bazaar at Mahableshwar as a substitute for gentian. See Watt, Dict. Econ. Prod. l. c.

3. **Swertia corymbosa** VAR. **Lawii,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 126. Stem erect, 1–2 ft. high, 4-winged, branched near the top only. Leaves sessile, ½–1½ by ¼–½ in., lanceolate, acuminate, 3-nerved, base broad, rounded-truncate. Flowers in lax cymes; pedicels ½–¾ in. long; bracts linear-lanceolate. Calyx divided almost to the base; segments ⅓ in. long, narrowly lanceolate, acute. Corolla white with blue nerves, equalling or slightly exceeding the calyx; tube hardly $\frac{1}{20}$ in. long; lobes ⅓ in. long, obovate, shortly apiculate and with a large circular pit with densely fimbriate margin at the base, covered by a large scale with a fimbriate margin. Filaments linear, flattened. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169. *Ophelia Lawii* (sp.), Wight, Ill. v. 2 (1850) p. 175, t. 157 bis, fig. 3, *c.* *O. pauciflora*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 211; Dalz. & Gibs. p. 156.—Flowers: Sept.

DECCAN: Sahyadri range, *Dalzell*! S. M. COUNTRY: Belgaum, *Ritchie*, 461!; Castlerock, *Bhiva*!, *Woodrow*. KANARA: Haliyál, *Woodrow*.—DISTRIB. Mountains of the W. Peninsula of India.

7. LIMNANTHEMUM, Gmel.

Aquatic herbs floating or creeping; stems erect or runner-like, or resembling petioles. Leaves alternate (rarely subopposite), orbicular, elliptic or ovate, deeply cordate (rarely peltate with a closed sinus), entire or obscurely crenate. Flowers white or yellow, dimorphic, solitary, or in pairs or clusters at the nodes, or on the apparent petioles close to or a little below the leaf-blade. Calyx 4–7-partite; segments lanceolate or oblong. Corolla subrotate; lobes 4–7, induplicate-valvate with fimbriate or naked margins. Stamens 4–7, inserted on the corolla-tube; filaments short. Ovary 1-celled; placentas 2, parietal; style

short or long; stigma 2-lobed. Capsule globose, ovoid or ellipsoid, indehiscent or bursting irregularly. Seeds usually numerous, smooth or tuberculate, sometimes winged.—DISTRIB. Wet places throughout the tropical and temperate regions of the globe; species about 14.

Stems petiole-like with a single shortly-petioled leaf at the end (node); flowers white.	
Corolla more than ½ in. across; lobes 5–7.	
Corolla-lobes hairy, not crested down the middle.....	1. *L. indicum.*
Corolla-lobes glabrous, with a longitudinal crest down the middle	2. *L. cristatum.*
Corolla less than ½ in. across; lobes 4, fimbriate	3. *L. parvifolium.*
Stems with several nodes and alternate leaves; flowers yellow.	4. *L. aurantiacum.*

1. **Limnanthemum indicum,** *Thwaites, Enum.* (1861) p. 205. Rhizome horizontal or oblique, giving off from the axils of sheathing membranous scales several long slightly rough petiole-like branches which reach the surface of the water, there producing a node from which start a tuft of roots, a cluster of flowers, a single floating leaf and a single branch, which again proceeds in the same manner. Floating leaves 3–12 in. in diam., orbicular, deeply cordate, with obtuse basal lobes and a triangular sinus and with more or less sinuate margins, thick, glabrous, green beneath; petioles stout, short, ¼–½ in. long. Flowers dimorphic, in clusters appearing above the water between the basal lobes of the leaves; pedicels 2–5 in. long; bracts ovate, acute, membranous. Calyx ⅓ in. long, deeply divided; lobes ¼ in. long, oblong, subacute. Corolla 1¼ in. across when expanded, white with a yellow centre; lobes usually 6, oblong, obtuse, ½ in. long, densely clothed with long cottony papillose hairs, not crested down the middle. Capsule subglobose, ¼–⅓ in. in diam. Seeds numerous (30 or more), not muriculate, shining, yellow. Fl. B. I. v. 4, p. 131; Dalz. & Gibs. p. 158; Trim. Fl. Ceyl. v. 3, p. 188; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169. *Limnanthemum Wightianum,* Griesb. in DC. Prodr. v. 9, p. 139 (as to long-styled form only). *Villarsia indica,* Venten. Choix, sub t. 9; Wight, in Hook. Bot. Misc. v. 3 (1833) p. 96, Suppl. t. 30; Grah. Cat. p. 123.—Flowers: Apr.–Sept. VERN. *Kumud.*

Tanks throughout the Presidency, but not so common as the next species. It may be found in the Konkan, the Deccan, Kanara, and Gujarat, and is abundant in a tank on the Table Rock at Panchgani.—DISTRIB. Throughout India; Ceylon, Afghanistan, Malaya, Australia, Mascarene and Fiji Islands.

2. **Limnanthemum cristatum,** *Griesb. in DC. Prodr.* v. 9 (1845) p. 139. A smaller plant than *Limnanthemum indicum.* Rhizome short, erect, with petiole-like branches as in *L. indicum,* but shorter and more slender. Floating leaves 2–4 in. in diam., orbicular, deeply cordate, purplish and with green veins beneath; petioles ¼–1¼ in. long. Flowers numerous, in dense clusters; pedicels ¾–2½ in. long, unequal. Calyx divided almost to the base; segments ¼ in. long, oblong-lanceolate, obtuse. Corolla white, ¾ in. across when expanded; lobes ⅓ in. long, obovate, rounded at the apex, glabrous, with a broad longitudinal crest down the middle of each lobe, the margins not ciliate. Capsule broadly ovoid or subglobose, ⅕ in. in diam. Seeds 10 or more, strongly muriculate, pale yellowish-brown. Fl. B. I. v. 4, p. 131; Dalz. & Gibs. p. 158; Wight, Ill. t. 157 bis, fig. 4; Trim. Fl. Ceyl. v. 3, p. 189; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prod. v. 4,

p. 641. *Villarsia cristata*, Spreng. Syst. v. 1, p. 582; Grah. Cat. p. 123. *Menyanthes cristata*, Roxb. Cor. Pl. v. 2, p. 3, t. 105.—Flowers: Apr.–Sept. VERN. *Kumudini.*

Common in tanks throughout the Presidency, where it is much more abundant than the last species. It may be found in the Deccan in the tank at Khandala.—DISTRIB. Throughout India, common; Ceylon, China.

3. **Limnanthemum parvifolium,** *Griesb. in DC. Prodr.* v. 9 (1845) p. 141. A small plant usually aquatic, but sometimes apparently terrestrial. Rhizome small, erect, with numerous roots; branches very slender, 3–12 in. long, producing from the end a single leaf and a cluster of flowers, but neither roots nor branches. Leaves of 2 kinds, (1) radical leaves forming a rosette, and (2) leaves terminating the branches; the former $\frac{1}{2}$–$\frac{3}{4}$ in. long, and about as broad as long, spathulate or deltoid, obtuse, on very broad petioles $\frac{1}{2}$–$1\frac{1}{4}$ in. long; the latter (floating leaves when the plant grows in water) $\frac{1}{2}$–$\frac{3}{4}$ by $\frac{1}{8}$–$\frac{1}{2}$ in., broadly ovate-oblong, rounded at the apex, deeply cordate, and with a wide triangular sinus at the base, on a petiole $\frac{1}{4}$–$\frac{3}{4}$ in. long. Flowers in clusters of 3–10 from the ends of the branches; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long. Calyx divided almost to the base; segments 4, oblong, acute, $\frac{1}{10}$ in. long. Corolla-lobes 4, oblong, subacute, fimbriate, slightly pilose, $\frac{1}{6}$–$\frac{1}{5}$ in. long. Capsule $\frac{1}{8}$ by $\frac{1}{12}$ in., oblong, apiculate, narrowed towards the base, the seeds bulging. Seeds 15 or more, orbicular, lentiform, about $\frac{1}{30}$ in. in diam., shining, microscopically muriculate, brown. Fl. B. I. v. 4, p. 132; Dalz. & Gibs. p. 158; Trim. Fl. Ceyl. v. 3, p. 189.

Common in tanks, but difficult to find owing to its small size, *Dalzell & Gibson.* KONKAN: Malwán, *Dalzell & Gibson.* GUJARAT: Surat, *Dalzell & Gibson.*—DISTRIB. India (W. Peninsula, Chittagong); Ceylon.

4. **Limnanthemum aurantiacum,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 136. Rhizome elongate; branches often purplish-red, long, not petiole-like, but with several nodes producing leaves and flowers. Leaves alternate, 1–$1\frac{1}{2}$ by $\frac{3}{4}$–$1\frac{1}{4}$ in., orbicular-ovate, rounded at the apex, deeply cordate with a narrow triangular sinus and subacute basal lobes, purple and dotted with black glands beneath; petioles of the radical leaves 4–6 in. long, those of the upper leaves $\frac{1}{2}$–3 in. long, dilated and sheathing at the base, often purplish. Flowers deep-yellow, few (1–3) from each node; pedicels leaf-opposed 1–$1\frac{1}{2}$ in. long, with conspicuous bracts (? reduced or undeveloped leaves) beneath. Calyx $\frac{1}{4}$ in. long; lobes 5, oblong, acute, $\frac{1}{5}$ in. long. Corolla-lobes 5, cuneate, emarginate, fimbriate, $\frac{1}{3}$ in. long. Capsule subglobose, $\frac{1}{4}$ in. in diam., apiculate, 10–20-seeded. Seeds $\frac{1}{16}$ in. in diam., almost spherical, very finely pubescent. Fl. B. I. v. 4, p. 132; Dalz. & Gibs. p. 158; Trim. Fl. Ceyl. v. 3, p. 190.—Flowers: Sept.

Without locality, *Ritchie*, ex Herb. *Dalzell*, 1873! KONKAN: *Stocks*!; Malwán, *Dalzell*!—DISTRIB. India (W. Peninsula); Ceylon.

ORDER LXXXVI. HYDROPHYLLACEÆ.

Herbs, rarely shrubs. Leaves radical or alternate (rarely opposite); stipules 0. Flowers hermaphrodite, regular, usually in scorpioid cymes, which are complete or reduced to geminate or solitary spikes or racemes,

or solitary axillary or terminal flowers. Calyx inferior, 5-partite. Corolla gamopetalous, 5-lobed; lobes imbricate, rarely contorted. Stamens 5, inserted on the corolla-tube and alternate with its lobes; filaments filiform; anthers ovate, oblong or linear. Disk hypogynous, more or less conspicuous or 0. Ovary superior, 1–2-celled; ovules 2–many, anatropous or amphitropous; styles 1 or 2. Capsule 2-valved or dehiscing irregularly. Seeds minute, oblong, globose or angular; albumen fleshy; embryo minute.—DISTRIB. Chiefly American; only 3 or 4 species in the Old World; species 150.

1. HYDROLEA, Linn.

Herbs, rarely undershrubs. Leaves alternate, entire; stipules 0. Flowers blue, in short terminal racemes or cymes, regular, 5-merous. Calyx divided nearly to the base; segments lanceolate. Corolla rotate or campanulate, 5-cleft; lobes imbricate. Stamens 5, inserted on the short corolla-tube; filaments equal, filiform, usually dilated at the base; anthers sagittate. Ovary completely 2-celled; ovules many in each cell; styles 2, distinct; stigma capitate. Capsule globose or ovoid, dehiscing septicidally by 2 valves or sometimes irregularly. Seeds many, with fleshy albumen, minute.—DISTRIB. N. & S. America, Tropical Africa, East India, Malaya, Australia; species about 14.

1. **Hydrolea zeylanica,** *Vahl, Symb. Bot.* v. 2 (1791) p. 46. *Annual herb; stem 6–20 in., usually decumbent and often rooting at the lower nodes, glabrous, somewhat succulent;* branches short, slender. *Leaves 1–2½ by ⅛–⅝ in., lanceolate or linear-lanceolate, acute, glabrous,* base tapering; petioles very short. Flowers numerous, in racemes on short lateral branches; pedicels ⅛–⅓ in. long, glandular-hairy; bracts leafy. Calyx ¼ in. long, glandular-hairy, enlarged in fruit; tube scarcely $\frac{1}{30}$ in. long; segments lanceolate, acute. Corolla of a fine blue with darker veins, deeply divided, ⅕–¼ in. long; tube about $\frac{1}{30}$ in. long; lobes ovate, acute. Stamens exserted; filaments dilated at the base; anthers sagittate. Styles 2, distinct, spreading. Capsule ⅛ by $\frac{1}{10}$ in., ovoid-oblong, enclosed in the enlarged persistent sepals. Seeds numerous, minute, oblong. Fl. B. I. v. 4, p. 133; Grah. Cat. p. 127; Dalz. & Gibs. p. 170; Wight, Icon. t. 601; Trim. Fl. Ceyl. v. 3, p. 191; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prodr. v. 4, p. 315.—Flowers: Nov.–Dec. VERN. *Popti; Keriti.*

Margins of tanks and damp places throughout the Presidency. KONKAN: margins of tanks, *Graham, Dalzell & Gibson*; Máhad, *Woodrow.* DECCAN: Rohe, *Gangaram!* GUJARAT: Bulsar, *Woodrow!*—DISTRIB. Throughout India in wet places and rice-swamps; Ceylon, Malaya, Tropical Africa, America, and Australia.

ORDER LXXXVII. BORAGINACEÆ.

Herbs, shrubs, or trees, very rarely climbing. Leaves usually alternate; stipules 0. Inflorescence normally a 2-chotomous cyme with helicoid branches, sometimes a simple unilateral raceme or spike or an irregularly 3-chotomous panicle (rarely of 1–2 flowers in the axils of the leaves); flowers hermaphrodite (rarely polygamous), usually regular; bracts leafy, small or 0. Calyx inferior, sometimes persistent; tube

campanulate or cylindric, sometimes very short; lobes 4–5 (rarely 6–8). Corolla various, 4–5 (rarely 6–∞) -lobed, often with scales or folds in the throat; lobes imbricate (rarely plicate or contorted). Stamens as many as the corolla-lobes, inserted in the throat or tube of the corolla, equal or slightly unequal; filaments filiform or dilated at the base, sometimes with a basal scale; anthers ovate, oblong or linear, obtuse, or with produced connective, dorsifixed, more or less 2-lobed at the base, cells parallel, introrsely or laterally dehiscent. Disk annular, entire or 5-lobed, sometimes inconspicuous or obsolete. Ovary superior, confluent at the base with the disk, entire or more or less completely 2–4-lobed, 2-celled and 2-ovulate or 4-celled and 1-ovulate; ovules erect or attached to the inner angle of the cell; style terminal in the entire, gynobasic in the lobed ovary, filiform or columnar, entire or once or twice divided, or rarely partite into 2 styles; stigma terminal or annular, entire or 2-lobed. Fruit drupaceous or dividing into 2–4 nutlets. Seeds erect, oblique or almost horizontal, straight or curved; testa membranous; albumen copious, scanty or 0; embryo straight or curved; cotyledons flat, plano-convex or thick and fleshy, entire (rarely 2-fid or -plicate); radicle usually much shorter than the cotyledons.—DISTRIB. Genera about 70; species about 1200, cosmopolitan.

Ovary entire or slightly 4-lobed; style terminal.
- Style twice-forked ..... 1. CORDIA.
- Style once-forked or styles 2.
  - Trees or shrubs ..... 2. EHRETIA.
  - Prostrate herb ..... 3. COLDENIA.
- Style 1, simple. A virgate shrub..... 4. RHABDIA.
- Style short (long and exserted in *Heliotropium ophioglossum*), entire or shortly 2-lobed (in *H. ophioglossum* divided into 2 long branches), usually with a broad stigmatic ring at the base of a conical or rarely oblong appendage. Herbs .... 5. HELIOTROPIUM.

Ovary deeply 4-lobed; style gynobasic (except in *Trichodesma*); nutlets usually 4.
- Anthers connivent into a cone, subexserted; connectives much produced, twisted together at the apex; style subterminal..... 6. TRICHODESMA.
- Anthers not connivent into a cone, included; connectives not much produced.
  - Nutlets attached to a convex or conical carpophore, often prominently margined.
    - Bases of the nutlets produced downwards ..... 7. CYNOGLOSSUM.
    - Bases of the nutlets hardly produced downwards .... 8. PARACARYUM.
  - Nutlets on a flat or nearly flat receptacle, not prominently margined.
    - Branched cano-tomentose undershrubs; corolla-throat villous ..... 9. SERICOSTOMA.
    - Hispid annual or perennial herbs; corolla-throat naked .... 10. ARNEBIA.

1. **CORDIA,** Linn.

Trees or shrubs rarely subscandent. Leaves alternate (rarely subopposite), petiolate, entire or toothed. Flowers polygamous (♂ and ☿), in cymes, spikes or heads. Calyx tubular or campanulate, smooth or ribbed; teeth usually 5, short, often irregular, sometimes obscure. Corolla infundibuliform, hypocrateriform, or campanulate, usually white

or orange; lobes 4–8, imbricate, reflexed or spreading. Stamens as many as the corolla-lobes, exserted or included; filaments often hairy at the base. Ovary 4-celled; ovule solitary in each cell, erect; style terminal, elongate, bipartite, the branches again bipartite; stigma capitate or clavate. Fruit usually with viscid pulp, drupaceous, of 4 or fewer 1-seeded cells; putamen often bony. Seeds exalbuminous; cotyledons plicate; radicle short.—DISTRIB. Tropics; species about 250.

Leaves alternate (sometimes almost subopposite in *C. Macleodii*), 3–5-nerved at base.
  Filaments hairy at the base.
    Calyx not ribbed.
      Leaves not tomentose beneath ..... 1. *C. Myxa.*
      Leaves stellately tomentose beneath ..... 2. *C. Wallichii.*
    Calyx ribbed.
      Leaves reaching 6 in. in diam., ovate, cordate, densely tomentose beneath ..... 3. *C. Macleodii.*
  Filaments glabrous.
    Leaves reaching 6 in. long; petioles 1–1¼ in. long ..... 4. *C. fulvosa.*
    Leaves not exceeding 3 in. long; petioles less than ½ in. long. 5. *C. monoica.*
Leaves subopposite, feather-nerved ..... 6. *C. Rothii.*

1. **Cordia Myxa,** *Linn. Sp. Pl.* (1753) p. 190. A moderate-sized deciduous tree reaching 40 ft., or a large shrub; bark dark-colored, rough, fissured; branchlets usually glabrous. Leaves alternate, 3–5 by 2½–4½ in., broadly ovate, obtuse, entire or the margins more or less sinuate-dentate, glabrous and more or less scabrous above without white discs (*cystoliths*) on the upper surface, base rounded or cordate or sometimes shortly cuneate; basal nerves 3 (rarely 5); petioles ¾–1½ in. long. Flowers white, polygamous (♂ and ☿), in large lax terminal and axillary pedunculate cymose panicles; peduncles 1–2 in. long; pedicels short; buds pyriform. Calyx ⅛–¼ in. long, glabrous or nearly so outside, pubescent inside, entirely closed over the corolla in bud, afterwards irregularly splitting on the expansion of the flower into about 5 shallow lobes. Corolla-tube as long as the calyx; lobes 5, oblong, obtuse, sometimes emarginate, narrow, recurved, equalling the tube. Filaments hairy at the base. Drupe ovoid, ½–1 in. long, pinkish-cream-colored or nearly black, shining, minutely rugose, apiculate with the remains of the style, supported by the saucer-shaped irregularly 5–10-lobed more or less longitudinally striate glabrous calyx. Fl. B. I. v. 4, p. 136; Grah. Cat. p. 136; Dalz. & Gibs. p. 173; Bedd. Flor. Sylvat. t. 245, A; Trim. Fl. Ceyl. v. 3, p. 193; Talb. Trees, Bomb. ed. 2, p. 243; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prod. v. 2, p. 563. *Cordia obliqua* (sp.), Willd. Phytogr. (1794) p. 4; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 137; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Var. β. *obliqua*, Trim. Fl. Ceyl. v. 3, p. 193. *C. latifolia*, Roxb. Fl. Ind. ed. Carey, v. 2, p. 330; Grah. Cat. p. 136; Dalz. & Gibs. p. 173.—Flowers: Mar.–Apr. VERN. *Bhokar*; *Gondani.*

Throughout the Presidency and Sind in deciduous forests. KONKAN: *Stocks* !, *Law* !; on the Ghâts and about villages, *Graham*; Rambág Matheran, *H. M. Birdwood.* DECCAN: Poona, *Cooke* !; Sakkar Pathár hill, *Woodrow*; Lanoli wood, *Gammie.* GUJARAT: common, *Dalzell & Gibson.*—DISTRIB. Throughout India, wild and cultivated; Ceylon, Egypt, Cochinchina, and Tropical Australia, often planted.

The tree is often cultivated. The fruit, known as *Sebesten*, is officinal. It is very

mucilaginous and is employed as a demulcent. The ripe fruit is eaten and the unripe fruit is pickled by the natives. See Watt, Dict. Econ. Prod. l. c.

Note.—I have included with the above *Cordia obliqua*, Willd. Phytogr. (1794) p. 4, n. 16, t. 4, fig. 1; Sp. Pl. v. 1 (1797) p. 1072, which is maintained as a separate species by Mr. C. B. Clarke (Fl. B. I. v. 4, p. 137). There are no type-specimens of Willdenow's plant either at Kew or at the British Museum, which renders it next to impossible to determine accurately the plant to which Willdenow refers in his description. The figure which accompanies that description certainly points to *C. Myxa*. De Candolle (Prodr. v. 9, p. 479) says that it seems at most a variety of *C. Myxa*, but is unknown to him, while Trimen (Fl. Ceyl. v. 3, p. 193) makes it a variety of that plant, but is at the same time doubtful as to the identity of the Ceylon plant with Willdenow's species. Wight (Icon. v. 4, part 2, p. 15) is doubtful as to *C. obliqua* being distinct from *C. Myxa*, and curiously enough gives but one figure (t. 1378) for both plants. Talbot, who has had a large experience of the trees of W. India, unites *C. obliqua* and *C. Myxa*. The variation in the size of the leaves, flowers, and fruit may be due to conditions of soil and climate. I have seen specimens of *C. Myxa* grown in the Botanic Garden at Poona with larger flowers than any of those whose dimensions are given in the Flora of British India; and, as the tree named *C. obliqua* is very common in Gujarat, the soil and climate of that Province, which has been styled the garden of W. India, may be a powerful factor in promoting luxuriance of growth.

2. **Cordia Wallichii,** *G. Don, Gen. Syst.* v. 4 (1837) p. 379. A moderate-sized tree. Leaves 4–5 in. long and about as broad as long, orbicular-ovate, glabrous or nearly so and without white discs (*cystoliths*) above, densely clothed with stellate, fulvous or white tomentum beneath, base subcordate or truncate, rarely shortly cuneate, 3-5 (usually 3) -nerved; petioles 1–1½ in. long. Flowers white, in terminal and lateral paniculate cymes. Calyx ¼–⅓ in. long, closed round the corolla in bud, irregularly splitting into 5 lobes on the expansion of the flower, pubescent inside; tube slightly tomentose or nearly glabrous; the teeth densely tomentose. Corolla about twice as long as the calyx. Filaments hairy at the base. Drupe ovoid, long-acuminate (*Talbot*). Dalz. & Gibs. p. 174; Bedd. Flor. Sylvat. t. 245; DC. Prodr. v. 9, p. 479; Talb. Trees, Bomb. ed. 2, p. 243. *Cordia obliqua* var. *Wallichii*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 137.—Flowers: Dec.-Jan.

Drier parts of the Presidency, tolerably common. DECCAN: between Malsej Ghát and Ahmednagar, *Dalzell & Gibson*. KANARA: Mandgod division of N. Kanara in deciduous forests, *Talbot*! GUJARAT: common, *Talbot*.—DISTRIB. India (W. Peninsula).

I have retained this as a separate species, to which rank it seems more entitled than *C. obliqua*. There is no type-specimen of Don's plant either at Kew or at the British Museum, and it would appear that his original specimen of *C. Wallichii* cannot be traced. Don says of *C. Wallichii* that the leaves are glabrous above and densely clothed with tomentum beneath, and that the calyx is campanulate and downy.

3. **Cordia Macleodii,** *Hook. f. & Thoms. in Journ. Linn. Soc.* v. 2 (1858) p. 128. A tree 30–40 ft. high; trunk reaching 2 ft. in diam. (*Talbot*); bark smooth, white, soft. Leaves alternate or sometimes almost subopposite, firm and hard when mature, 2–6 in. long, and nearly as broad as long, ovate, obtuse, 3–5-nerved at the base, the upper surface pubescent when young, rough but shining, usually with white discs, and with impressed nerves when old, the lower surface densely clothed with grey or tawny woolly tomentum consisting of more or less branched (hardly stellate) hairs; the basal as well as the secondary and transverse tertiary nerves prominent; petioles 1–2 in. long, densely woolly-tomentose. Flowers polygamous, subsessile, in dense paniculate terminal and axillary tomentose cymes; male flowers with a rudimentary ovary but

without style or stigma. Calyx $\frac{1}{3}$ in. long, obconic, densely tomentose, ribbed; lobes short, obtuse. Corolla $\frac{5}{8}$ in. long; lobes $\frac{1}{3}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., exceeding the tube, spathulate-oblong, obtuse, veined. Stamens usually 6, exserted; filaments hairy at the base; anthers of male flowers large, those of hermaphrodite flowers smaller. Drupe $\frac{1}{2}$–$\frac{3}{4}$ in. long, ovoid, acute, supported on the cup-shaped ribbed tomentose persistent crenate or denticulate calyx, not edible. Fl. B. I. v. 4, p. 139; Talb. Trees, Bomb. ed. 2, p. 244; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prod. v. 2, p. 563.—Flowers: Mar.–Apr. VERN. *Dahiván.*

Forests of N. Kanara, Belgaum, and the Konkan; often planted as a roadside tree in southern drier districts. DECCAN: Rohe near Poona, *Bhiva*!; Máwal, *Woodrow*!; Sinhagad, *Sirpati*! S. M. COUNTRY: Belgaum, *Ritchie*, 1902!—DISTRIB. Central India and W. Peninsula.

The timber is excellent, hard and tough, and is largely used in Kanara in the construction of country carts. The species has become rare in the Haliyál subdivision of N. Kanara owing to the large demand for the timber for cart-building (*Talbot*).

4. **Cordia fulvosa,** *Wight, Icon.* v. 4, part 2 (1850) p. 15, t. 1380. A small tree; branches terete, glabrous; young shoots clothed with short fulvous pubescence. Leaves 2½–6 by 1¾–3½ in., ovate-oblong or suborbicular, obtuse or subacute, entire or crenate, scabrous and with white discs (*cystoliths*) above, obscurely 3-nerved, the mature leaves with hard (not woolly) thin fulvous tomentum beneath; petioles 1–1½ in. long. Flowers in rather dense, short, paniculate, terminal and axillary fulvous-tomentose cymes; pedicels short. Calyx ⅓ in. long, obconic, clothed outside with short fulvous tomentum, glabrous inside; teeth usually 5, deltoid, with a small tuft of short hairs at the apex of each. Corolla ½ in. long; tube ⅕ in. long; lobes 4–6 (usually 6), spreading, obovate-oblong with undulate margins, bifid at the apex. Stamens as many as the corolla-lobes; filaments glabrous. Drupe when immature ovoid-conical, apiculate with the remains of the style, seated on the persistent cup-shaped calyx. Fl. B. I. v. 4, p. 140; Bedd. For. Man. in Flor. Sylvat. p. clxvi; Talb. Trees, Bomb. ed. 2, p. 244.—Flowers: June–Aug.

KONKAN: *Stocks*!, *Law*!, *Talbot*. S. M. COUNTRY: Belgaum in dry forests, *Talbot*; south hills, Belgaum, *Ritchie*, $\frac{502}{2}$! KONKAN: Jagalbet, *Ritchie*, 1904!—DISTRIB. India (W. Peninsula).

5. **Cordia monoica,** *Roxb. Cor. Pl.* v. 1 (1795) p. 43, t. 58. A small tree. Leaves 1½–3 by ¾–1½ in., ovate or elliptic, obtuse or subacute, subentire or crenate, rough with white discs (*cystoliths*) above, pubescent or villous beneath, base rounded or shortly cuneate, 3-nerved; petioles round, ⅕–⅓ in. long. Flowers subsessile, in small dense paniculate tomentose cymes; male and fertile flowers on separate branches (*Brandis*). Calyx ¼ in. long, obconic, densely fulvous-hairy or -tomentose outside, glabrous inside; lobes 5, short, triangular, often obscure. Corolla ⅓ in. long; lobes longer than the tube, ⅕ in. long, oblong, obtuse, reflexed. Stamens exserted; filaments glabrous. Drupe size of a cherry, ovoid, apiculate, smooth, bright-yellow, seated on the cup-shaped, fulvous-pubescent, veined, irregularly lobed, persistent calyx; stone 4-celled, drilled at the apex, 3 of the cells barren and 1 one-seeded (*C. B. Clarke*). Fl. B. I. v. 4, p. 137; Grah. Cat. p. 136; Bedd. For.

Man. in Flor. Sylvat. p. clxvi; Trim. Fl. Ceyl. v. 3, p. 193; Talb. Trees, Bomb. ed. 2, p. 244; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169.—Flowers: Aug.–Sept.

Rare. I have found it only near Badami, a Railway Station on the S. Mahratta Railway, where it has also been found by *Talbot* and *Woodrow*.—DISTRIB. India (Central Provinces and W. Peninsula); Ceylon.

6. **Cordia Rothii,** *Roem. & Schult. Syst.* v. 4 (1819) p. 798. A small tree 20–40 ft. high; bark grey, furrowed. Leaves subopposite, 2½–4 by ¾–1¼ in., oblanceolate-oblong, rounded at the apex, rough above, more or less pubescent beneath, inconspicuously feather-nerved (not 3-nerved at the base), base tapering into the petiole; petioles ½ in. long. Flowers small, white, usually tetrandrous, in lax terminal or axillary pedunculate cymes; peduncles ¾–1 in. long; pedicels short. Calyx ⅛–⅕ in. long, veined, obconic at the time of flowering, minutely pubescent outside and with shining silky hairs inside; lobes obtuse, small. Corolla ¼ in. long; lobes usually 4, equalling the tube, oblong, obtuse, reflexed. Filaments glabrous. Drupe usually 1-seeded, ovoid, acute, mucronate, ⅜–½ in. long, glabrous, longitudinally striate, yellow or reddish-brown when ripe, with a gelatinous pellucid edible pulp. Fl. B. I. v. 4, p. 138; Dalz. & Gibs. p. 174; Bedd. For. Man. in Flor. Sylvat. p. clxvi; Wight, Icon. t. 1379; Talb. Trees, Bomb. ed. 2, p. 244; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prod. v. 2, p. 565. *Cordia angustifolia*, Roxb. Fl. Ind. ed. Carey, v. 2, p. 338 (*not* of Roem. & Schult.); Grah. Cat. p. 136.—Flowers: Nov. VERN. *Gundi*; *Gondáni*; *Liári*.

Dry districts of the Presidency, often planted near villages, very common in Sind and Rajputana. DECCAN: in gardens, *Ritchie*, 503! GUJARAT: Deesa, *Raoji*! SIND: *Dalzell*!, *Stocks*, 427!, *Vicary*!, *Ritchie*!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (Panjáb, W. Peninsula); Ceylon, Arabia, Abyssinia.

A decoction of the bark possesses astringent properties, and is used as a gargle. The fruit is eaten by the poorer classes and is also pickled. The wood is used for fuel and in the manufacture of agricultural implements. See Watt, Dict. Econ. Prod. l. c.

Cordia Sebestena, Linn. Sp. Pl. (1753) p. 190. A small tree 15–30 ft. high, a native of Cuba, with rough coarse ovate or elliptic leaves 4–6 in. long, and abundant large cymes of showy scarlet flowers, followed by pure white fruits 1½ by ¾ in., is occasionally cultivated in gardens. Woodr. Gard. in Ind. ed. 5, p. 389.—Flowers: Jan.–Mar.

2. EHRETIA, Linn.

Trees or shrubs, glabrous, pubescent, or scabrous. Leaves alternate. Flowers small, usually white, in terminal and axillary corymbose cymes or panicles, rarely solitary. Calyx small, 5-partite. Corolla-tube short; lobes 5, spreading, imbricate. Stamens 5, inserted on the corolla-tube, usually exserted; filaments filiform; anthers ovate or oblong. Ovary 2-celled with 2 ovules in each cell, or 4-celled with 1 ovule in each cell; style terminal, 2-fid or 2-partite, or styles 2; stigma capitate or clavate. Drupe small, subglobose, 4 (or by suppression 3–1) -seeded; endocarp hard, consisting of 1 four-celled or 2 two-celled or 4 one-celled pyrenes (3–1 pyrenes or cells sometimes suppressed). Seeds straight; albumen

scanty; cotyledons ovate or oblong, not plicate.—DISTRIB. Warmer parts of the hemispheres, more numerous in the eastern; species about 50.

Style bifid less than ½-way down.
Leaves sometimes reaching 5 in. long, glabrous beneath ..... 1. *E. lævis.*
Leaves not reaching 3 in. long, persistently hairy beneath ..... 2. *E. aspera.*
Styles 2, or 1 style divided almost to the base.
Leaves not exceeding 1 in. long..... 3. *E. buxifolia.*

1. **Ehretia lævis,** *Roxb. Cor. Pl.* v. 1 (1795) p. 42, t. 56. A small tree 25-40 ft. high, glabrous or more or less pubescent; bark grey, thick, smooth, scaly. Leaves 2½–5 by 1½–3 in., very variable, often unsymmetric, elliptic-oblong or obovate, subacute, acuminate, obtuse or emarginate at the apex, entire, glabrous or nearly so when mature, paler beneath, usually unequally cuneate, but sometimes rounded or almost truncate at the base; main nerves 6–10 pairs; petioles ⅜–¾ in. long. Flowers white, sessile or nearly so, in much-branched glabrous or pubescent corymbose axillary and terminal cymes composed of unilateral spikes or racemes; peduncles ¼–½ in. long; bracts 0. Calyx $\frac{1}{16}$ in. long, pubescent; segments $\frac{1}{20}$ in. long, ovate, acute. Corolla ⅛ in. long; lobes ⅛ in. long, oblong, obtuse, spreading. Filaments glabrous; anthers not apiculate. Style stout, more or less deeply bifid; stigmas capitate. Drupe sub-2-lobed, rather broader than long (about ⅛ in. long by ⅙ in. broad), red at first, black and wrinkled when dry. *Fl. B. I.* v. 4, p. 141; *Grah. Cat.* p. 137; *Dalz. & Gibs.* p. 170; *Wight, Icon.* t. 1382; *Bedd. Flor. Sylvat.* t. 246; *Trim. Fl. Ceyl.* v. 3, p. 195; *Talb. Trees, Bomb.* ed. 2, p. 245; *Woodr.* in *Journ. Bomb. Nat.* v. 12 (1898) p. 169; *Watt, Dict. Econ. Prod.* v. 3, p. 203.—Flowers: Jan.–June. VERN. *Dátrang.*

Throughout the Presidency in deciduous forests. KONKAN: *Stocks*!; foot of Matheran Ghát, *H. M. Birdwood*; near Malwán, *Dalzell & Gibson.* DECCAN: Bhimashankar, *Gibson* ex *Graham.* S. M. COUNTRY: Rámghát, *Ritchie,* 924!; Belgaum, *Ritchie,* 924! KANARA: Karwar, *Woodrow*; Kála naddi, *Ritchie,* 924! GUJARAT: jungles to the south-east of Surat, *Law* ex *Graham*; Dangs, *Bhiva*!—DISTRIB. Throughout India; Ceylon, Persia, China, Australia.

VAR. 1. *floribunda,* Brandis, *For. Flor.* (1874) p. 340. Leaves acuminate, softly pubescent and ciliate. C. B. Clarke, in *Hook. f. Fl. B. I.* v. 4, p. 142. *Ehretia floribunda* (sp.), *Benth.* in *Royle, Ill.* p. 306. Scarcely deserving of being classed as a variety.

SIND: Shah-Bilawal, *Stocks,* 607!
There is only 1 specimen in Herb. Kew.

VAR. 2. *canarensis,* C. B. Clarke, in *Hook. f. Fl. B. I.* v. 4 (1883) p. 142, which is described as having broadly oblong symmetric strongly-nerved leaves narrowed at both ends, cannot, in my opinion, be maintained as a good variety. The leaves of the plant are very variable, a fact to which Trimen (*Fl. Ceyl.* v. 3, p. 196) calls attention, and notes that the leaves in moist regions are larger and acuminate. I have found on the same specimen of the so-called variety both symmetric and unsymmetric leaves, so that the chief distinguishing character is not a constant one. The so-called variety is abundant in the moist Konkan and N. Kanara forests.

2. **Ehretia aspera,** *Roxb. Cor. Pl.* v. 1 (1795) p. 41, t. 55. A shrub; branches usually glabrous, short, terete. Leaves very variable, ¾–2½ by ½–1½ in., elliptic-oblong or obovate, rounded or shortly acuminate, sometimes retuse, scabrous, slightly hairy or glabrous above, persistently hairy beneath; petioles ¼–¾ in. long. Flowers white, in paniculate cymes which are at first close, corymbose and apparently terminal, afterwards lax and lateral. Calyx $\frac{1}{10}$ in. long, hairy outside; segments $\frac{1}{16}$ in. long, ovate-oblong, subacute, ciliate. Corolla ¼–⅓ in. long; tube longer than the calyx; lobes about equalling the tube, oblong, obtuse. Ovary ovoid; style ⅕–¼ in. long, bifid about ⅓ the way down; stigmas capitate. Drupe depressed-globose, ¼ in. across; pyrenes usually 4, bony. Bedd. For. Man. in Flor. Sylvat. p. clxvi. *Ehretia obovata*, R. Br. in Salt, Abyss. (1814) App. p. lxiv (*name only*). *Ehretia obtusifolia*, Hochst. ex DC. Prodr. v. 9 (1845) p. 507; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 142; Rich. Tent. Flor. Abyss. v. 2 (1851) p. 83; Talb. Trees, Bomb. ed. 2, p. 245; Watt, Dict. Econ. Prod. v. 3, p. 204. *Ehretia lævis* var. *aspera*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 142.—Flowers: Mar.–May.

Deccan: Poona, *Woodrow*, 974!; Bowdhán, *Bhiva*!; plains about Poona (small shrub 3 ft. high), *Dalzell*! Sind: *Stocks*!, *Dalzell*!; Shah-Bilawal, *Stocks*, 539! —Distrib. India (Panjáb, W. Peninsula); Beluchistan, Abyssinia.

3. **Ehretia buxifolia,** *Roxb. Cor. Pl.* v. 1 (1795) p. 42, t. 57. A small shrub 3–4 ft. high; branches numerous, slender, divaricate; bark reddish-brown, cracked. Leaves numerous, subsessile, fascicled on arrested branchlets, ⅜–1 by ⅙–⅓ in., obovate, cuneate, rounded and sometimes with a few crenatures at the apex, rough above with short bristly hairs with a white spot at the base of each when dried, shining and polished above, paler and with conspicuous venation beneath. Flowers white, axillary, solitary or 2 together on slender hairy peduncles 0–⅓ in. long. Calyx hairy, $\frac{1}{10}$ in. long; segments $\frac{1}{16}$ in. long, lanceolate or spathulate-oblong, acute. Corolla ⅕ in. long, campanulate; lobes $\frac{1}{10}$ in. long, broadly ovate, obtuse, spreading or recurved. Stamens exserted. Styles 2, longer than the stamens, undivided, or 1 style 2-partite to near the base. Drupe ⅛ in. in diam., globose, apiculate, shining, scarlet; pyrene 1, four-celled. Fl. B. I. v. 4, p. 144; Bedd. For. Man. in Flor. Sylvat. p. clxvii; Trim. Fl. Ceyl. v. 3, p. 196; Talb. Trees, Bomb. ed. 2, p. 245; Watt, Dict. Econ. Prod. v. 3, p. 203.—Flowers: Mar.

Rare. Without locality, *Gibson*!, *Dalzell*! Deccan: dry forests, *Talbot*. S. M. Country: common on the stony hills near Dharwar, *Talbot*.—Distrib. India (W. Peninsula); Ceylon, Malaya to Formosa and the Philippines.

3. COLDENIA, Linn.

Branched usually diffuse or prostrate herbs. Leaves alternate, small, crisped. Flowers white or yellow, axillary, sessile or nearly so, the upper sometimes in a 1-sided leafy spike. Calyx 4–5-partite; segments lanceolate or linear. Corolla-tube short, rather broad, naked or with 4–5 scales within; lobes 4–5, spreading, imbricate in bud. Stamens 4–5, inserted on the corolla-tube, included; filaments short; anthers ovate. Ovary ovoid, slightly 4-lobed, 2-celled with 2 ovules, or sub-4-celled with 1 ovule in each cell; styles 2, distinct from the base or

cohering to the middle, but easily separable, terminal; stigmas capitate. Drupe almost dry, of 4 subconnate 1-seeded pyrenes. Seeds exalbuminous or with scanty albumen; cotyledons flat, broad; radicle short, straight, incurved or incumbent on the cotyledons.—DISTRIB. All American but 1, the following, which is widely dispersed throughout the warmer regions of the globe; species 11.

1. **Coldenia procumbens,** *Linn. Sp. Pl.* (1753) p. 125. A procumbent herb usually lying quite flat on the ground; stems reaching 18 in. long, shaggy with white hairs; branches often numerous; young parts silky with white hairs. Leaves crisped, ½–1½ by ¼–¾ in., obovate-oblong, rounded at the apex, coarsely serrate or subpinnatifid, very hairy on both sides, base tapering; petioles ⅛–⅜ in. long, shaggy. Flowers pale-yellow, solitary, axillary, nearly sessile. Calyx divided to the base or nearly so, very hairy; segments 4, ovate, acute, 1/10 in. long, ciliate. Corolla 1/10 in. long; lobes 4, oblong, rounded at the apex, 1/16 in. long. Stamens 4, scarcely higher than the corolla-tube. Fruit a dry 4-lobed pyramid about ⅛ in. high and ⅛ in. across at the widest part, grooved on two and ribbed on the other two sides, with a sharp central double beak, hairy, muriculate, ultimately separating into 1-celled beaked pyrenes. Seeds albuminous. Fl. B. I. v. 4, p. 144; Grah. Cat. p. 135; Dalz. & Gibs. p. 171; Aitch. Pb. & Sind Pl. p. 93; Trim. Fl. Ceyl. v. 3, p. 197; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169; Watt, Dict. Econ. Prod. v. 2, p. 502.—Flowers: Sept.-Oct. VERN. *Tripakshi*; *Tripanki.*

Moist ground round tanks and in rice-fields. KONKAN: *Law*! DECCAN: Lanoli, *Woodrow.* S. M. COUNTRY: Badami, *Cooke*!, *Woodrow*!, *Bhiva*! KANARA: Yellapur, *Ritchie,* 413! SIND: *Stocks,* 549!—DISTRIB. Throughout India in moist places, Ceylon, Tropics generally.

4. **RHABDIA,** Mart.

A shrub; branches twiggy, glabrous or more or less pubescent. Leaves alternate, often fascicled, entire or obscurely toothed. Flowers small, few, at the apices of the branchlets between the leaves, rarely laxly racemose. Calyx 5-partite; segments lanceolate, acuminate, imbricate. Corolla deeply 5-cleft; tube short, subcampanulate; lobes oblong, imbricate in bud. Stamens 5, inserted on the corolla-tube, included or exserted; filaments filiform; anthers oblong or ovate. Ovary ovoid, 2-celled with 2 ovules, or sub-4-celled with 1 ovule in each cell; style filiform, simple; stigma capitate or minutely 2-lobed. Drupe with 4 crustaceous 1-seeded pyrenes. Seeds oblong; albumen scanty; cotyledons ovate.—DISTRIB. Warmer regions of both hemispheres; species 1.

1. **Rhabdia lycioides,** *Mart. Nov. Gen. & Sp.* v. 2 (1826) p. 137, t. 195. A small much-branched shrub 2–6 ft. high; branches virgate, with numerous short lateral arrested branchlets; young parts pubescent. Leaves ¼–1 by ⅛–¼ in., nearly sessile, crowded or fasciculate, spathulate, usually rounded at the apex, sometimes very shortly apiculate, usually entire, more or less hairy or glabrous, rarely densely hispid; petioles very short. Flowers pink, shortly pedicellate, solitary or 2 or 3 terminating short lateral branches; bracts at the base of the pedicels

lanceolate, acute. Calyx ⅛ in. long, more or less hairy, somewhat fleshy, divided almost to the base; segments 5, imbricate, the 3 outer slightly larger than the 2 inner, all ovate-lanceolate, acuminate, ciliate. Corolla nearly ⅓ in. long; lobes twice as long as the tube, oblong, rounded at the apex, spreading. Stamens exserted beyond the corolla-tube; filaments ⅛ in. long. Ovary ovoid; style ⅛ in. long; stigma capitate or minutely 2-lobed. Fruit ⅛ in. in diam., nearly dry, subglobose, shorter than the persistent calyx, tipped with the remains of the style, orange when ripe. Fl. B. I. v. 4, p. 145; Trim. Fl. Ceyl. v. 3, p. 197; Talb. Trees, Bomb. ed. 2, p. 245; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169. *Rhabdia viminea*, Dalz. in Hook. Icon. Pl. (1852) t. 823; Dalz. & Gibs. p. 170. *Ehretia cuneata*, Wight, Icon. t. 1385.—Flowers: Oct.–Dec. VERN. *Machim.*

KONKAN: *Stocks*!, *Law*!; banks of the river Pen, *Dalzell*!; beds of Konkan rivers pretty common, *Dalzell & Gibson.* DECCAN: Koina valley below Mahableshwar, *Cooke*!; Kirkee, bed of Mula river near the Powder Works, *Woodrow*!; 12 miles W. of Poona, *Bhiva*! S. M. COUNTRY: Castlerock, *Kanitkar*! KANARA: beds of streams in N. Kanara, *Woodrow*!, *Talbot*; Kála naddi, *Ritchie*, 1905!; Gairsoppa, *Dalzell*!—DISTRIB. Throughout India in river beds; Ceylon, Tropical S.E. Asia, Africa, and Brazil.

5. **HELIOTROPIUM,** Linn.

Herbs or undershrubs (rarely shrubs), villous or scabrid, rarely quite glabrous. Leaves alternate (rarely subopposite). Flowers usually small, often unilateral along the branches of forked terminal scorpioid cymes, sometimes all axillary or arranged in simple leafy racemes. Calyx more or less deeply 5-cleft; lobes linear or lanceolate. Corolla-tube cylindric, usually naked at the throat; lobes 5, imbricate or induplicate, usually spreading in flower. Stamens 5, inserted in the corolla-tube, included; filaments very short; anthers ovate, oblong or lanceolate, obtuse, mucronate, or with a small discoid appendage at the apex. Ovary completely or imperfectly 4-celled, 4-ovulate; ovule pendulous from the inner angle of the cell near its apex; style terminal, short or long, usually with a depressed conic or broad stigmatic ring below the apex. Fruit somewhat fleshy, 2- or 4-sulcate or -lobed, at length dividing into 4 distinct or geminately cohering nutlets (sometimes 1 or 2 of the nutlets suppressed). Seeds straight or curved; albumen usually scanty; cotyledons plano-convex; radicle short.—DISTRIB. Throughout the tropical and temperate zones of both hemispheres; species about 150.

Leaves reaching 4 in. long; fruit mitriform, 4-beaked ..... 1. *H. indicum.*
Leaves 2 in. long at most; fruit of 2–4 nutlets, not beaked.
  Corolla-lobes patent, caudate-acuminate.
    Stigma simple ..... 2. *H. zeylanicum.*
  Corolla-lobes not caudate-acuminate.
    Stigma with 2 linear branches exserted from the corolla . 3. *H. ophioglossum.*
    Stigma not exserted from the corolla.
      Anthers free, not connate by their connectives.
        Calyx-lobes short, not ½ the length of the tube.
          A prostrate villous herb ..... 4. *H. supinum.*
        Calyx deeply divided.
          Stamens inserted above the middle of the corolla-tube; stigma short, subcapitate ..... 5. *H. rariflorum.*
          Stamens inserted at or below the middle of the corolla-tube; stigma elongate, conical above.
            Leaves elliptic or obovate, the lower with long petioles.

Corolla-lobes with intermediate teeth.	
Spikes reaching 2 in. long	6. *H. Eichwaldi.*
Corolla-lobes without intermediate teeth.	
Spikes 6–8 in. long; leaves reaching 1¼ in.; calyx-segments subequal	7. *H. calcareum.*
Spikes 2–4 in. long; leaves not exceeding ¾ in.; calyx-segments very unequal	8. *H. ovalifolium.*
Leaves lanceolate, sessile.	
An erect shrub with stiff hairs from bulbous bases	9. *H. tuberculosum.*
Anthers connate by their produced connectives, afterwards separating and with a small disc at their apex.	
An erect semi-shrubby herb; racemes reaching 6 in. long	10. *H. paniculatum.*
A prostrate or decumbent herb; spikes reaching 2 in. long	11. *H. marifolium.*

1. **Heliotropium indicum,** *Linn. Sp. Pl.* (1753) p. 130. A coarse somewhat succulent annual ½–2 ft. high, with stout stem and ascending branches more or less densely hirsute with spreading hairs. Leaves alternate or often subopposite, 1¾–4 by 1–2 in., ovate or ovate-oblong, obtuse or subacute, usually with a few scattered hairs above, minutely pilose beneath, the margins much undulate or subserrate, base rounded or sometimes cordate or narrowed, often unequal-sided and then suddenly contracted and decurrent into the petiole; nerves and veins conspicuous on the lower side; petioles ¼–1½ in. long, more or less winged. Flowers pale-violet, numerous, sessile, 2-ranked, in simple or rarely forked usually extra-axillary bristly ebracteate spikes 2–6 in. long. Calyx $\frac{1}{10}$ in. long, bristly with a few long hairs outside; segments $\frac{1}{16}$ in. long, linear-lanceolate, acute, unequal. Corolla $\frac{1}{5}$ in. long; tube $\frac{1}{8}$ in. long, hairy outside, narrowed upwards; limb infundibuliform; lobes about $\frac{1}{20}$ in. long, orbicular-oblong. Stamens inserted below the middle of the corolla-tube; filaments very short; anthers $\frac{1}{50}$ in. long, ovate, acute. Style $\frac{1}{40}$ in. long; stigma $\frac{1}{60}$ in. long, with an annular frill at the base and with a short obtuse apex. Fruit $\frac{1}{6}$ in. long, deeply 2-lobed, each lobe compressed, bluntly 4-ribbed, produced above into a short blunt bidentate beak and containing 2 angular beaked hard 1-seeded pyrenes which have each an empty cavity on the inner side. Fl. B. I. v. 4, p. 152; Trim. Fl. Ceyl. v. 3, p. 200; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170; Watt, Dict. Econ. Prod. v. 4, p. 214. *Tiaridium indicum,* Lehm. Asperifol. p. 14; Wight, Ill. t. 171; Grah. Cat. p. 135; Dalz. & Gibs. p. 172.—Flowers: Oct.–Dec. VERN. *Bhurundi.*

A common weed, often found on rubbish-heaps and in waste places by roadsides. KONKAN: Ajeru salt-swamps, Bombay, *Woodrow*; Bombay, *Bhiva*!; Banda near Sawantwari, *Kanitkar*! S. M. COUNTRY: Rámghát, *Ritchie*, 494!; Dharwar, *Cooke*! KANARA: Kála naddi, *Ritchie*, 494!—DISTRIB. Throughout India; Ceylon, Malaya, Tropical Africa, and America.

The plant is used in Bombay as a local application to boils, sores, and the stings of insects and reptiles. See Watt, Dict. Econ. Prod. l. c.

2. **Heliotropium zeylanicum,** *Lam. Encyc. Méthod.* v. 3 (1789) p. 94 (*not* of Wall.). An erect annual 1–3 ft. high, scabrous and coarsely hairy with stiff hairs arising from white bulbous bases, the globose bases shewing distinctly in dried specimens. Leaves 1–2 by $\frac{1}{6}$–½ in., sessile or nearly so, lanceolate, acute, entire, densely clothed with stiff hairs arising from white bulbous bases, base tapering. Flowers

sessile, in elongate spikes 2–6 in. long, usually in one rank along the rhachis, but sometimes (especially towards the apex of the spike) 2-ranked. Calyx $\frac{1}{10}$ in. long, hairy on both sides, divided to the base; sepals ovate, acute, densely ciliate. Corolla-tube $\frac{1}{6}$–$\frac{1}{5}$ in. long, the upper half slightly swollen and setose outside; lobes $\frac{1}{10}$–$\frac{1}{8}$ in. long, caudate-acuminate, spreading. Stamens inserted in the swollen part of the corolla, surrounding the style; anthers sessile, $\frac{1}{20}$ in. long, ovate-oblong, bifid at the apex. Style glabrous, $\frac{1}{12}$ in. long; stigma $\frac{1}{18}$ in. long, the stigmatic ring surmounted by a long cone which is penicillate at the apex with erect white glistening hairs. Nutlets 4, ovate in longitudinal section, $\frac{1}{12}$ in. long, slightly incurved, rounded and rugose or tuberculate on the back, cuneate on the inner face, 2-seeded. (The Fl. B. I. says there are 2 nutlets, but I have invariably found 4 in the mature fruit.) Fl. B. I. v. 4, p. 148; Wight, Icon. t. 892; Gürke, in Engl. & Prantl, Pflanzenf. v. 4, part 3, A, p. 93, fig. 38, C–F; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 169. *Heliotropium subulatum*, Hochst. ex Martelli, Fl. Bogos. (1886) p. 95. *Tournefortia subulata*, Hochst. in DC. Prodr. v. 9 (1845) p. 528; Dalz. & Gibs. p. 171. *Tournefortia zeylanica*, Wight, Ill. t. 170.—Flowers: Oct.–Jan.

Konkan: *Law*! S. M. Country: Badami, *Cooke*! Gujarat: Deesa, *Stocks*, 12!; Chandod, *Kanitkar*! Sind: *Bhola Puran*!; Karachi, *Woodrow*.—Distrib. India (Panjáb, W. Peninsula); Tropical Africa.

Note.—It seems strange that this plant with the specific name "*zeylanicum*" should not occur in Ceylon. Trimen (Fl. Ceyl. v. 3, p. 199) is of opinion that the original plant figured by Burmann (Fl. Ind. p. 41, t. 16, fig. 2), from which Lamarck took his description, is *H. paniculatum*, R. Br. The fact that both Burmann and Lamarck have overlooked the most distinctive characteristic of the species, the caudate-acuminate corolla-lobes, certainly strengthens Trimen's contention, but the specific name has been so long established that it would be inconvenient to change it to *H. subulatum*, Hochst. [ex Martelli, Fl. Bogos. (1886) p. 59], which would apparently be the name to be substituted for it.

3. **Heliotropium ophioglossum,** *Stocks, ex Aitch. Pb. & Sind Pl.* (1869) p. 94. Suffruticose, 6–15 in. high, branched from near the base; stems and branches hoary with soft hairs and also clothed with stiff hairs arising from white bulbous bases which are easily seen in dried specimens. Leaves $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{4}$–$\frac{1}{2}$ in., densely hirsute with stiff hairs from bulbous bases and also clothed with a softer pubescence, the lower leaves petiolate (often obscurely so), elliptic, acute, running down into the petiole, the upper leaves subsessile, lanceolate, acute, all with sub-entire undulate margins. Flowers sessile, distant, 1–2-ranked, in simple geminate or ternate densely hairy spikes 2–6 in. long. Calyx divided almost to the base, coarsely hairy with stiff hairs; segments 5, linear, acute, $\frac{1}{8}$ by $\frac{1}{30}$ in., strongly ciliate. Corolla slightly exserted beyond the calyx; tube $\frac{1}{6}$ in. long, cylindric, slightly pubescent outside, the throat plicate; lobes 5, about $\frac{1}{20}$ in. long, broadly ovate or suborbicular, obtuse or subacute, undulate, veined, usually with small intermediate teeth between the lobes. Stamens inserted below the middle of the corolla-tube; anthers linear-oblong, rounded at the tip. Style very short; stigma shortly conical at the base, prolonged above into a long subulate appendage about $\frac{1}{6}$ in. long divided at the apex to about $\frac{1}{3}$ the way down into 2 filiform recurved acute arms which are exserted beyond the corolla. Fruit $\frac{1}{16}$ in. long, glabrous, black; nutlets 4, rounded on the back and at their apex, 1-seeded. Fl. B. I. v. 4, p. 149; Gürke,

in Engl. & Prantl, Pflanzenf. v. 4, part 3, A, p. 93, fig. 38, K, L; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.—Flowers: Jan.–Mar.

In the Bombay Presidency confined to Sind. SIND: *Woodrow, W. Strachan*!, *Stocks*, 466!, *Dalzell*, 16!; Jemadar ka Landa near Karachi, *Stocks*, 466!; Malir (near Karachi), *Bhola Puran*!—DISTRIB. Beluchistan, Tropical Africa.

4. **Heliotropium supinum,** *Linn. Sp. Pl.* (1753) p. 130. A prostrate softly villous herb; stems numerous, spreading to 6–12 (rarely 18) in. from the centre, thickly clothed with soft white hairs. Leaves $\frac{1}{2}$–1 by $\frac{1}{4}$–$\frac{1}{2}$ in., alternate (rarely opposite), elliptic, obtuse, plicate, softly villous on both sides, more or less crenate, base acute; petioles $\frac{1}{8}$–$\frac{1}{2}$ in. long, slender, villous. Flowers subsessile, in simple or once-forked densely villous cymes. Calyx $\frac{1}{8}$–$\frac{1}{6}$ in. long, very hairy on both sides; lobes about $\frac{1}{30}$ in. long, ciliate, the divisions between the lobes marked down the calyx-tube by a thin easily tearable membrane, which, if torn, makes the calyx seem 5-partite. Corolla $\frac{1}{8}$–$\frac{1}{6}$ in. long, much exserted, being pushed up by the expansion of the ovary; lobes very short (about $\frac{1}{40}$ in. long), rounded. Stamens inserted a little below the middle of the corolla-tube; anthers $\frac{1}{20}$ in. long, lanceolate, acute. Style $\frac{1}{30}$ in. long; stigma $\frac{1}{40}$ in. long, the stigmatic ring conspicuous, surmounted by a small conical or subcylindric appendage which is penicillate at the apex. Fruit of 2–3 (rarely 4) dark-brown nutlets, ovate in horizontal section, rounded and obscurely tuberculate on the back, usually with strong light-brown margins, the face nearly flat when the fruit consists of 2 nutlets (making the nutlets plano-convex), but angled when there are more than 2. Fl. B. I. v. 4, p. 149; Dalz. & Gibs. p. 171; Wight, Icon. t. 1387; Trim. Fl. Ceyl. v. 3, p. 199; Gürke, in Engl. & Prantl, Pflanzenf. v. 4, part 3, A, p. 93, fig. 38, M, N; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170. *Piptoclaina malabarica*, G. Don, Gen. Syst. v. 4, p. 364; Grah. Cat. p. 135.—Flowers: Mar.

Common in rice-fields. KONKAN: *Gibson*! DECCAN: Sinhagad, *Woodrow*; Poona, *Woodrow, Kanitkar*!; Máwal, *Kanitkar*!; Karli, *Ranade*! S. M. COUNTRY: Dharwar, *Cooke*!, *Woodrow*; Belgaum, *Ritchie*, 499! GUJARAT: *Kanitkar*! SIND: *Stocks*, 244!—DISTRIB. India (Panjáb, Upper Gangetic plain, W. Peninsula); Ceylon, S. Europe, N. & S. Africa, Canary Islands.

I have found 3 nutlets as often as 2 in the Bombay specimens, and frequently, when there were only 2, there was a vacant space for a third.

VAR. *malabarica*, C. B. Clarke, in Fl. B. I. l. c., the fruit of which consists of 4 nutlets without conspicuous margins, cannot, in my opinion, stand as a variety. I have, many years ago, examined a very large number of living specimens and have found 2, 3, or occasionally 4 nutlets on the same plant, so that the number of nutlets cannot be regarded as a distinctive character. In the case where there are only 2 nutlets the margins are large and conspicuous, but when the nutlets increase to 4 the margins naturally dwindle in size, as they have less room to expand, and sometimes almost disappear.

5. **Heliotropium rariflorum,** *Stocks, in Kew Journ. Bot.* v. 4 (1852) p. 174. A stiff undershrub 6–18 in. high with a perennial root; stems erect, branched, rigid and, as well as the branches, hoary with appressed hairs. Leaves $\frac{1}{6}$–1 by $\frac{1}{16}$–$\frac{1}{6}$ in., linear, subacute, with more

or less revolute margins, densely clothed with appressed hairs; petioles very short. Flowers distant, in terminal or extra-axillary slender bracteate spikes 1–3 in. long, often paniculately arranged; bracts $\frac{1}{8}$–$\frac{1}{6}$ in. long, stalked or not, lanceolate, hairy, scattered along the rhachis. Calyx hairy, 5-partite; tube scarcely $\frac{1}{30}$ in. long; segments $\frac{1}{16}$ in. long, linear-lanceolate, ciliate. Corolla $\frac{1}{10}$ in. long, hairy outside; tube broad, cylindric, with hairs in the throat; lobes $\frac{1}{25}$ in. long, ovate, subacute. Stamens inserted above the middle of the corolla-tube; filaments filiform, short; anthers broadly ovate, acuminate. Ovary ovoid, glabrous; style $\frac{1}{30}$ in. long; stigma about $\frac{1}{3}$ the length of the style, subcapitate. Fruit 4-lobed, about $\frac{1}{10}$ in. across, projecting above the persistent spreading calyx-segments, hispid with appressed hairs. Fl. B. I. v. 4, p. 152; Boiss. Fl. Orient. v. 4, p. 144.

In the Bombay Presidency confined to Sind. SIND: *Dalzell*, 17!, *Bhola Puran*!, *Woodrow*; Tata district, *Bhola Puran*!; Jemadar ka Landa near Karachi, *Stocks*, 492! —DISTRIB. India (Panjáb); Afghanistan, Beluchistan, Nubia, Socotra.

6. **Heliotropium Eichwaldi,** *Steud. ex DC. Prodr.* v. 9 (1845) p. 535. Herbaceous, erect, branched from a woody base; stems and branches clothed with soft hairs usually arising from glistening bulbous bases. Leaves 1–1¾ by ½–1 in., elliptic-oblong or obovate, usually obtuse, hairy on both sides with hairs usually arising from small glistening bulbous bases, base usually tapering; nerves more or less conspicuous beneath; petioles of the lower leaves reaching 1 in. long or more, those of the upper leaves much shorter. Flowers usually 2-ranked, in dense geminate or ternate ebracteate spikes which are short and helicoid at the apex when young, reaching about 2 in. long when older. Calyx densely hairy on both sides, divided almost to the base; segments $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate-lanceolate, acute. Corolla $\frac{1}{6}$–$\frac{1}{5}$ in. long; tube pubescent outside, glabrous inside; lobes $\frac{1}{20}$ in. long, orbicular-oblong, with undulate margins and often with intermediate teeth between the lobes. Stamens inserted below the middle of the corolla-tube; anthers $\frac{1}{16}$ in. long, linear-oblong, rounded at the tip. Style scarcely any; stigma $\frac{1}{20}$ in. long, the conical appendage broad at the base, acute and bifid at the apex, the stigmatic ring not conspicuous. Fruit usually leaving the calyx behind when falling; nutlets 4, ellipsoid, obtuse at both ends, $\frac{1}{12}$ in. long, minutely verrucose and finely puberulous. Fl. B. I. v. 4, p. 149; Watt, Dict. Econ. Prod. v. 4, p. 214. *Heliotropium europæum*, Aitch. Pb. & Sind Pl. p. 94 (*not* of Linn.). *H. calcareum*, Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170 (*not* of Stocks).—Flowers: Nov.–Jan.

In the Bombay Presidency apparently confined to Sind. SIND: Karachi, *Stocks*, 457!; Magar Pir, *Stocks*!; Sehwan, *Bhola Puran*, 6!, *Kanitkar*!; Hyderabad, *Cooke*! —DISTRIB. India (Panjáb, Kashmir); W. and Central Asia, Australia.

7. **Heliotropium calcareum,** *Stocks, in Kew Journ. Bot.* v. 4 (1852) p. 174. Erect, branched, herbaceous with woody base; stem and branches clothed with soft ash-colored pubescence. Leaves ½–1¼ by ⅓–¾ in., elliptic or obovate, obtuse or subacute, softly hairy on both sides, base acute; nerves prominent beneath; petioles ⅛–½ in. long, those of the lower leaves the longest. Flowers 1-ranked, in solitary or

geminate ebracteate spikes, scorpioid when young, elongate reaching 6–8 in. long (*Stocks*) when older. Calyx densely hairy on both sides with silvery hairs, divided almost to the base; segments $\frac{1}{10}$ in. long, linear-lanceolate, subacute, densely ciliate with very long white silky hairs. Corolla $\frac{1}{6}$ in. long; tube $\frac{1}{8}$ in. long, cylindric, pubescent outside; lobes orbicular, with crenulate margins and without intermediate teeth between the lobes. Stamens inserted at the middle or very little below the middle of the corolla-tube; anthers $\frac{1}{12}$ in. long, lanceolate, acuminate, the tips reaching to the level of the top of the corolla-tube. Style very short, about $\frac{1}{60}$ in. long; stigma $\frac{1}{20}$–$\frac{1}{16}$ in. long, broadly conical at the base, tapering towards the tip, pubescent and bifid at the apex, the stigmatic ring not sharply defined. Fruit usually deciduous with the calyx; nutlets 4, ovate in longitudinal section, subacute, $\frac{1}{10}$ in. long, closely covered with silvery hairs, not verrucose, slightly margined. Fl. B. I. v. 4, p. 150; Boiss. Fl. Orient. v. 4, p. 128. *Heliotropium cinerascens*, Aitch. Pb. & Sind Pl. p. 94 (*not* of Steud.).

Hills of Sind, *Stocks*, ex Kew Journ. Bot. l. c.

I have not seen any specimens from Sind. Those in Herb. Kew. are from Beluchistan. —Distrib. Beluchistan.

8. **Heliotropium ovalifolium,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 38. Herbaceous, 6–15 in. high, erect or decumbent, sometimes with diffusely spreading more or less prostrate branches; stem and branches densely clothed with long silky appressed white hairs. Leaves $\frac{1}{4}$–$\frac{3}{4}$ by $\frac{1}{6}$–$\frac{1}{3}$ in., elliptic or obovate, mucronate, closely hairy with appressed long silky hairs, base tapering; petioles of the lower leaves $\frac{3}{8}$–$\frac{1}{2}$ in. long, those of the upper leaves usually shorter. Flowers white, 2-ranked, approximate, in slender ebracteate, hairy, usually once-forked spikes 2–4 in. long. Calyx $\frac{1}{10}$ in. long, divided almost to the base, hairy on both sides with soft appressed hairs; segments bristle-pointed, thick, unequal, one of them about twice as broad as any of the other 4, the larger segment $\frac{1}{20}$ in. wide, ovate, acute, the smaller segments linear-oblong, subacute, all densely ciliate. Corolla $\frac{1}{8}$ in. long; tube cylindric, scarcely swollen over the stamens, hairy outside and with hairs in the throat inside; lobes $\frac{1}{25}$ in. long, ovate-oblong, acute, without intermediate teeth. Stamens inserted below the middle of the corolla-tube; anthers $\frac{1}{40}$ in. long, lanceolate, acute, the connective produced. Ovary glabrous; style almost 0; stigma $\frac{1}{40}$ in. long, conical, slightly penicillate at the very apex; stigmatic ring inconspicuous. Nutlets $\frac{1}{20}$ in. long, ovate in longitudinal section, subacute, densely hairy with silky white hairs on the convex back, cuneate on the face, 1-seeded, the nutlets when falling leaving the calyx behind on the rhachis. Fl. B. I. v. 4, p. 150; Aitch. Pb. & Sind Pl. p. 94; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170. *Heliotropium coromandelianum*, Retz. Obs. fasc. 2 (1781) p. 9; Grah. Cat. p. 135; Dalz. & Gibs. p. 171; Wight, Icon. t. 1388.—Flowers: Jan.–Feb. The calyx-lobes, which are persistent on the rhachis, are erroneously described as *bracts* in Hook. f. Fl. B. I. l. c.

Stocks (without locality) in Herb. Wight. 548! Deccan: Poona, *Ranade*!, *Woodrow*!; Bijapur, *Woodrow*!; Bhimashankar, *Gibson* ex *Graham*. S. M. Country: Belgaum, *Ritchie*, 1901! Kanara: *Law*!—Distrib. India (Bengal, W. Peninsula); Tropical Africa, Australia.

9. **Heliotropium tuberculosum,** *Boiss. Fl. Orient.* v. 4 (1879) p. 147. Erect, rigid, 6–20 in. high from a woody base, turning black in drying, very harsh and scabrid with stiff white hairs springing from white tubercular bases; branches leafy, erect. Leaves ½–2 by $\frac{1}{10}$–$\frac{1}{3}$ in., subsessile, lanceolate, acute, densely clothed with stiff hairs from white bulbous bases, margins more or less crenulate, often revolute, base tapering. Flowers usually 2-ranked, in solitary conjugate or sometimes paniculately arranged dense short spikes. Calyx rather more than ⅛ in. long; segments $\frac{1}{10}$ in. long, linear-lanceolate, acute or subobtuse, densely hairy outside with long stiff hairs, slightly hairy inside and with more or less membranous margins. Corolla tubular, ⅛ in. long, densely hairy outside; tube scarcely swollen at the middle; limb crisped and plicate, truncate, scarcely distinctly lobed. Stamens inserted about the middle of the corolla-tube; anthers $\frac{1}{25}$ in. long, subsessile, narrowly linear-lanceolate. Style $\frac{1}{25}$ in. long; stigma $\frac{1}{20}$ in. long, the apex conical, slightly pubescent, shortly bifid, the stigmatic ring conspicuous. Fruit about $\frac{1}{10}$ in. long and as broad as long, glabrous or softly hairy; nutlets connate by pairs (sometimes more or less easily separable into 4). *Heliotropium undulatum,* Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170 (*not* of Vahl). *H. undulatum* var. *tuberculosum,* Boiss. Diagn. v. 1, fasc. 11 (1849) p. 89.—Flowers: Dec.

In the Bombay Presidency confined to Sind. SIND: *Stocks*!; Hyderabad, *Cooke*!; Magar Pir, *Kanitkar*!; Karachi, *Cooke*!—DISTRIB. Persia.

10. **Heliotropium paniculatum,** *R. Br. Prodr.* (1810) p. 494 (*not* of Roxb.). Herbaceous, 1–2 ft. high, with numerous twiggy ascending branches; stem and branches clothed with appressed hairs (especially so in the arid climate of Sind), or sometimes quite glabrous. Leaves ¼–1 by $\frac{1}{20}$–⅛ in., subsessile or very shortly petiolate, linear, acute, clothed with appressed hairs on both sides or sometimes glabrous above, the margins recurved. Flowers shortly pedicellate, in slender simple or forked racemes 2–6 in. long, usually with linear-lanceolate hairy sessile bracts ⅛ in. long. Calyx appressedly hairy outside, divided almost to the base; segments $\frac{1}{10}$ in. long, unequal. Corolla ⅛ in. long, hairy outside; tube slightly swollen and with a ring of hairs in the throat; lobes about $\frac{1}{20}$ in. long, ovate-deltoid, with plicate sinuses between. Stamens inserted rather low down in the corolla-tube; filaments filiform, short; anthers $\frac{1}{30}$ in. long, broadly ovate, acute, at first connate by the produced connectives, afterwards separating, each anther carrying away a portion of the swollen connective so as to form a small disc on the tip of the anther. Style about $\frac{1}{50}$ in. long; stigma a little longer than the style, conical at the apex, the stigmatic ring conspicuous. Fruit globose, shorter than the spreading calyx-segments which are persistent on the rhachis after the fruit falls; nutlets 4, hairy on the convex back, acute at the apex, cuneate on the face, $\frac{1}{16}$ in. long. Fl. B. I. v. 4, p. 151; Trim. Fl. Ceyl. v. 3, p. 200; Woodr. in Journ. Bomb Nat. v. 12 (1898) p. 170. *Heliotropium linifolium,* Lehm. Aperifol. p. 35; Wight, Icon. t. 1391.

Not very common in the Bombay Presidency, where it chiefly occurs in Sind. S. M. COUNTRY: Badami, *Bhiva*! SIND: *Bhola Puran*!; Magar Pir near Karachi, *Kanitkar*!—DISTRIB. India (W. Peninsula, Pegu); Ceylon, Siam, Australia.

11. **Heliotropium marifolium,** *Retz. Obs.* fasc. 2 (1781) p. 8. A much-branched decumbent perennial herb with a woody base; stems and branches usually spreading from near the root, often to a distance of several inches from the centre, clothed with appressed hairs. Leaves $\frac{1}{4}$–$\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{8}$ in. (rarely reaching 1 by $\frac{1}{6}$ in.), ovate or lanceolate, acute, sometimes oblanceolate, densely clothed with appressed hairs; petioles very short. Flowers in short axillary and terminal bracteate spikes 1–2 in. long; bracts conspicuous, foliaceous, lanceolate, scattered along the rhachis. Calyx $\frac{1}{6}$ in. long, hairy on both sides with long slender hairs; segments $\frac{1}{8}$ in. long, slightly unequal, lanceolate, ciliate. Corolla $\frac{1}{5}$ in. long; tube cylindric, hairy outside, glabrous inside; lobes $\frac{1}{20}$ in. long, ovate-deltoid, acute, distant, with broad plicate sinuses and minute teeth between the lobes. Stamens inserted below the middle of the corolla; filaments filiform, very short; anthers about $\frac{1}{20}$ in. long, ovate, lanceolate, at first united at the apex by the produced connectives which are fused together into a small ball, afterwards separating, each anther carrying away a part of the ball as a small disc at its tip. Ovary ovoid; style $\frac{1}{30}$ in. long; stigma $\frac{1}{40}$ in. long, the apex bluntly conical or subcylindric, the stigmatic ring large and prominent. Fruit subglobose, pubescent, separating into 4 nutlets with a much rounded back. Wall. Cat. 2092; Wight, Icon. t. 1390; Dalz. & Gibs. p. 171; Trim. Fl. Ceyl. v. 3, p. 200 *in adnot.* *H. marifolium* var. *Wallichii*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 152. *H. scabrum*, Retz. Obs. fasc. 2, p. 8; Trim. Fl. Ceyl. v. 3, p. 200. *H. Rottleri*, Dalz. & Gibs. Bo. Fl. p. 171.

KONKAN: *Law!*; Vingorla, *Dalzell & Gibson.* KANARA: Chandavar, *Ritchie*, 533! GUJARAT: Domas near Surat, *Dalzell!*—DISTRIB. Throughout India; Ceylon.

I cannot see how this plant, which is described as var. *Wallichii* in Hook. f. Fl. B. I. l. c., differs from the type. Retzius describes the stems as "fruticulose, procumbent, ramous, hispid." The var. *Wallichii* would seem to be quite unnecessary.

VAR. *laxiflora.* Suberect. Leaves lanceolate, densely clothed with appressed hairs tending obliquely from the midrib towards the edges. Spikes rather lax, slender. Roth, Nov. Pl. Sp. (1821) p. 102 (*sp.*); Dalz. & Gibs. p. 171. *H. bracteatum* var. *laxiflora*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1883) p. 152; Trim. Fl. Ceyl. v. 3, p. 200 (*in adnot.*)

KONKAN: Worli hill, Island of Bombay, *Dalzell & Gibson.* DECCAN: *Dalzell & Gibson.*

This has been included on the authority of Dalzell & Gibson. I have seen no specimens from the Bombay Presidency.

Heliotropium peruvianum, Linn. Sp. Pl. ed. 2 (1762) p. 187. A native of Peru, as its name denotes, often grown in gardens. It is the well-known *Cherry Pie* of English gardens and its fragrant flowers are too well known to need description. The plant was introduced into Western India by the Earl of Clare. Grah. Cat. p. 135; Dalz. & Gibs. Suppl. p. 60; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170 & Gard. in Ind. ed. 5, p. 390.

6. TRICHODESMA, R. Br.

Erect herbs usually hispid. Leaves opposite or alternate, quite entire. Flowers in racemose terminal unilateral cymes simple or bifid, usually bracteate. Calyx deeply 5-lobed, enlarged in fruit, angled, winged, or auricled at the base; lobes imbricate. Corolla-tube broadly cylindric or 5-gonous, throat naked or slightly closed by the intrusion of the sinuses; lobes 5, shortly ovate or lanceolate, often long-acuminate, contorted, overlapping to the left. Stamens 5; filaments short, broad, and, as well as the connectives, usually hairy on the back; anthers linear-oblong, acuminate, erect, conniving. Ovary 4-lobed; ovules sub-horizontal, attached to the inner angles of the cell; style subterminal, slender; stigma small. Fruit pyramidal; nutlets 4, broad, tuberculate or smooth, with or without a raised entire or pectinate or glochidiate margin, the lower face almost entirely adnate to the torus. Seeds sub-orbicular or obovoid; embryo straight or slightly curved; cotyledons plano-convex; radicle short.—DISTRIB. Tropical and Subtropical Africa, Asia, and Australia; species about 10.

Nutlets with or without a faint entire margin.
Calyx at flowering time cordate or hastate at the base ..... 1. *T. indicum.*
Calyx at flowering time rounded at the base..... 2. *T. zeylanicum.*
Nutlets with a raised white spiny margin on the inner edge.
Calyx at flowering time truncate at the base..... 3. *T. africanum.*

1. **Trichodesma indicum,** *R. Br. Prodr.* (1810) p. 496. Annual, erect, much-branched, very hispid, 6–18 in. high. Leaves 1½–4 by ¼–2 in., variable, sessile, ovate or oblong, or lanceolate-oblong, obtuse or subacute, clothed above with stiff hairs springing from white (when dry) circular tubercles, less harshly hairy and more or less densely villous beneath, cordate or hirsute at the base. Flowers pale violet-blue, solitary and leaf-opposed and in terminal few-flowered cymes; pedicels ¼–½ in. long, slender, nodding, hispid. Calyx $\frac{7}{16}$–½ in. long (including the auricles), deeply divided, hispid with long hairs; segments lanceolate, acute, cordate or hastate at the base, connate by the basal auricles. Corolla ½ in. long; tube ¼ inch long; limb oblique, infundibuliform, thinly hairy inside; lobes ⅛–$\frac{1}{6}$ in. long (not including the acumen which is sometimes short, sometimes very long), ovate-deltoid, suddenly acuminate. Cone of anthers large and very pointed, clothed on the back with dense white hairs; anthers included or exserted, with a few hairs at the base, inserted on the corolla-tube, the produced connectives linear, very acute, finally twisted together. Ovary ovoid, acute, tapering into the style, glabrous; style nearly ¼ in. long. Fruit pyramidal, sub-truncate at the apex, tipped with the persistent style, 4-ribbed; nutlets ⅕ in. long, ovoid, smooth and polished on the back, rugose on the inner face, not or scarcely margined, bluish-white or nearly white when fully ripe, leaving 5 deep ovate pits on the membranous axis when falling. Fl. B. I. v. 4, p. 153; Grah. Cat. p. 134; Dalz. & Gibs. p. 173; Wight, Illustr. t. 172; Trim. Fl. Ceyl. v. 3, p. 201; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170; Watt, Dict. Econ. Prod. v. 6, part 4, p. 80.—Flowers: Aug.–Oct. VERN. *Chota-kalpa.*

Tolerably common throughout the Presidency. KONKAN: *Stocks!, Law!*; Kalyan, *Woodrow.* DECCAN: common, *Gibson* ex *Graham*; Poona, *Cooke!, Woodrow, Ranade!*

S. M. Country: Belgaum, *Ritchie*!—Distrib. Throughout the greater part of India in the plains; Ceylon, Cabul, Beluchistan, Persia, Mauritius.

Var. *amplexicaulis*. Bristly with hairs arising from tubercles, but hardly at all villous, glabrous beneath except on the nerves and veins. *Trichodesma amplexicaule* (sp.), Roth, Nov. Pl. Sp. (1821) p. 104; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 153; Dalz. & Gibs. p. 173; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.

Scarcely deserving of even varietal rank. Mr. C. B. Clarke (Fl. B. I. l. c.) suggests that it may probably be a form of *T. indicum*. I have often endeavoured to find even one reliable character by which to distinguish between the species *T. indicum* and *T. amplexicaule*, but have failed to do so. The amount of hairiness of the lower side of the leaves cannot be relied upon as a constant character. I have seen specimens, authoritatively recognized as *T. amplexicaule*, which were more densely villous than many of the other species. In fact, what R. Brown (Prodr. p. 496) says of *Trichodesma zeylanicum*, viz. that it is "a polymorphous plant especially in the amount of coarse hairs and pubescence," is equally true of *T. indicum*.

2. **Trichodesma zeylanicum,** *R. Br. Prodr.* (1810) p. 496. Annual, erect, 1–2 ft. high; stem stout, often purplish, and, as well as the branches, clothed with long soft hairs. Leaves 2–4 by $\frac{1}{2}$–1 in., lanceolate-oblong, acute or subobtuse, densely clothed above with short stiff hairs from bulbous white bases, finely pubescent and with a few pustular hairs beneath, base usually narrowed; petioles $\frac{1}{6}$–$\frac{1}{2}$ in. long, often obscure or almost 0. Flowers light-blue, numerous, usually in terminal bracteate paniculate cymes (occasionally a few solitary flowers in the upper axils); pedicels $\frac{1}{2}$–$\frac{3}{4}$ in. long, slender, hairy, nodding; bracts foliaceous. Calyx divided to the base or nearly so, clothed with soft appressed hairs, rounded at the base; segments $\frac{1}{3}$ in. long at flowering time, lanceolate, acute, with strong midrib, pubescent inside. Corolla-tube $\frac{1}{5}$ in. long, campanulate; lobes about $\frac{1}{16}$ in. long, somewhat obovate, rounded, plicate, with a sudden spirally-twisted acumination $\frac{1}{10}$ in. long from a triangular base. Cone of the anthers $\frac{1}{4}$ in. long, densely hairy at the back; anthers lanceolate, hairy at the base, the produced linear acute connectives about as long as the cells and finally spirally twisted at the apex. Ovary ovoid, glabrous; style $\frac{1}{4}$ in. long, slender, glabrous; stigma minute. Nutlets $\frac{1}{6}$–$\frac{1}{5}$ in. long, broadly ovoid, subobtuse, faintly margined, the inner face slightly rugose, the back smooth and polished, grey when ripe. Fl. B. I. v. 4, p. 154; Grah. Cat. p. 134; Dalz. & Gibs. p. 173; Trim. Fl. Ceyl. v. 3, p. 202; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170; Watt, Dict. Econ. Prod. v. 6, part 4, p. 80. *Borago zeylanica*, Jacquin, Icon. Pl. Rar. v. 2 (1789) t. 314 (corolla-lobes not properly shewn).—Flowers: Jan.

Konkan: Matheran, *H. M. Birdwood.* Deccan: Poona districts, *Woodrow*; Ambeghát, *Kanitkar*! S. M. Country: Belgaum, *Ritchie*, 1843!; Badami, *Woodrow.* Kanara: *Woodrow.* Gujarat: Baroda, *Cooke*!; on the Atavesi south of the Tapti river, *Gibson* ex *Graham*.—Distrib. India (W. Peninsula); Ceylon, Malaya, Australia, Mascarene Islands.

3. **Trichodesma africanum,** *R. Br. Prodr.* (1810) p. 496. A branched herb 1–1½ ft. high, densely clothed with very stiff sharp white prickly hairs springing from bulbous bases which are white when dry,

Leaves opposite, $\frac{1}{2}$–3 by $\frac{1}{4}$–$1\frac{1}{2}$ in., ovate-oblong, acute, clothed like the stem with prickly hairs from bulbous bases, base usually acute; petioles of the lower leaves sometimes reaching 1 in. long, the upper leaves sessile. Flowers in many-flowered panicles; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, filiform, densely clothed with long white hairs. Calyx clothed with stiff white hairs which are often $\frac{1}{12}$ in. long, truncate, not cordate nor hastate at the base when flowering, in fruit sometimes very slightly cordate; segments $\frac{1}{4}$ in. long at flowering time, lanceolate, acute. Corolla blue, with yellow throat and 5 purple spots; tube $\frac{1}{10}$–$\frac{1}{8}$ in. long, narrowly campanulate; lobes $\frac{1}{5}$ in. long (including a long acute apiculus), ovate-deltoid. Cone of the anthers about $\frac{1}{4}$ in. long, slightly pubescent on the back; anthers lanceolate, the produced connectives nearly as long as the cells, twisted together at the apex. Ovary ovoid, tapering into the style; style slender, rather more than $\frac{1}{5}$ in. long, glabrous; stigma minute. Nutlets ovoid, $\frac{1}{5}$ in. long, rugose on the inner, smooth on the outer face, with a raised white spiny margin on the inner edge. Fl. B. I. v. 4, p. 154; Aitch. Pb. & Sind Pl. p. 97; Boiss. Fl. Orient. v. 4 (1879) p. 280; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170; Watt, Dict. Econ. Prod. v. 6, part 4, p. 80.—Flowers: Aug.

SIND: *Stocks*, 575!; Thano-Bula-Khán, *Woodrow*; Laki, *Woodrow*.—DISTRIB. India (Panjáb); Tropical and South Africa, Cabul, Persia, Arabia.

7. CYNOGLOSSUM, Linn.

Perennial or biennial erect hairy herbs. Leaves alternate, the radical often with long petioles. Flowers in usually elongate, generally ebracteate, sparingly branched or loosely paniculate racemes, bluish or purple, ultimately distant, pedicelled or subsessile. Calyx 5-partite, scarcely enlarged in fruit, patent or reflexed. Corolla distinctly veined; tube short, the throat closed with obtuse or arched scales; lobes 5, imbricate, obtuse, patent. Stamens 5, inserted on the corolla-tube, included beneath the scales; filaments short; anthers ovoid or shortly oblong, obtuse. Ovary with 4 distinct lobes from an almost flat receptacle; ovules horizontal, attached to the inner angle of the cell; style short or long, usually persistent, rigid and sometimes split to the base into laciniæ deciduous with the nutlets. Fruit a depressed pyramid formed of 4 nutlets adnate by their inner halves to a linear carpophore with a shortly conic base, the nutlets rather convex or flat on the dorsal side with or without an elevated margin, scarcely produced at the apex, the base rounded or almost saccate, produced downwards. Seeds straight or slightly curved; cotyledons wide, flat; radicle short.—DISTRIB. Tropical or subtropical regions of both hemispheres, rare on mountains in the Tropics; species about 60.

Nutlets with a deep margin ..... 1. *C. denticulatum* var. *zeylanica*.

Nutlets scarcely margined ..... 2. *C. Ritchiei*.

1. **Cynoglossum denticulatum,** VAR. **zeylanica,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 157. Annual, erect, branched, 1–2 ft. high; stem and branches more or less angular, the older clothed with spreading, the young branches with appressed hairs. Leaves 1¾–3 by ⅝–1 in. (larger when grown in cultivated ground), lanceolate, usually acute, clothed above with stiff short hairs arising from small bulbous bases which are white when dry, usually appressed-hairy beneath, with ciliate and more or less subdenticulate margins, base narrowed and decurrent; nerves strong and densely hairy on the lower side; petioles of the lower leaves sometimes reaching 1 in. long, those of the upper leaves very short, obscure, or 0. Flowers distant in terminal and axillary ebracteate racemes 6–8 in. long, the racemes usually in pairs when terminal, often simple when axillary; pedicels distinct all along the raceme, short, filiform. Calyx at flowering time ⅛ in. long, softly hairy; lobes $\frac{1}{16}$ in. long at flowering time, enlarged to about ⅛ in. in fruit, ovate-oblong, obtuse, ciliate, with a strong midrib conspicuous on the inner face. Corolla ⅛ in. long; lobes about $\frac{1}{16}$ in. long, oblong or suborbicular, rounded at the apex, tender. Anthers $\frac{1}{30}$ in. long, oblong, the tips just level with the top of the corolla-tube. Nutlets attached to the carpophore for less than half their length, glochidiate all over, ovoid, $\frac{1}{12}$–$\frac{1}{10}$ in. long inside the margin, the margin deep, furnished on the rim with long stout prickles with a conspicuous head and with 5 or 6 small decurved hooks from the apex. *Cynoglossum canescens*, Grah. Cat. p. 135 (*not* of Willd.). *C. glochidiatum*, Dalz. & Gibs. p. 172 (*not* of Wall.). *C. lanceolatum*, Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170 (*not* of Forsk.).—Flowers: Oct.–Nov. VERN. *Lichardi.*

KONKAN: in various parts, *Dalzell*. DECCAN: Poona, a common weed, *Woodrow*!; Koina valley below Mahableshwar, *Cooke*!; Párghát, *Dalzell*; Panchgani, *Woodrow*; Khandala, *Graham*.—DISTRIB. India (W. Peninsula).

Though named *C. zeylanicum* by Thunberg the plant is not known in Ceylon.

2. **Cynoglossum Ritchiei,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 157. An erect slender annual 12–18 in. high; older stems with spreading, the younger branches with appressed soft hairs. Radical leaves 3–3½ by ⅝–⅞ in., with petioles 1–1½ in. long; cauline leaves 1–1¼ by ¼–⅜ in., shortly petiolate or sessile, all lanceolate, acute, hairy above with hairs usually springing from small bulbous bases which are white when dry, base acute, narrowed. Flowers pale blue, in terminal and axillary ebracteate, often forked racemes; pedicels slender, up to ¼ in. long. Calyx softly hairy, $\frac{1}{12}$ in. long in flower, enlarging to about ⅛ in. long in fruit; segments ovate-oblong or linear-oblong, obtuse, ciliate. Corolla ⅛–$\frac{1}{6}$ in. long; lobes equalling the tube, oblong, obtuse. Anthers $\frac{1}{40}$ in. long, oblong, obtuse. Nutlets ⅛–$\frac{1}{6}$ in. long, attached to the carpophore by the upper half, not or scarcely margined, glochidiate on all sides with headed prickles furnished with several deflexed hooks.

Belgaum, *Ritchie*, 493!

There is but 1 specimen in Herb. Kew. marked as above. I have seen no others.—DISTRIB. India (W. Peninsula).

EXCLUDED SPECIES.

CYNOGLOSSUM LANCEOLATUM, Forsk. Fl. Ægypt.-Arab. (1775) p. 41 (*not* of Heyne). This has been given by Mr. C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 156,

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as occurring in Bombay (*Law*) and Mr. Clarke cites *C. micranthemum*, Dalz. & Gibs. Bo. Fl. p. 172, as a synonym. I have seen no specimens from Bombay; there are none in Herb. Kew. either from Bombay or from any part of India. The nutlets are described in Fl. B. I. l. c. as not or obscurely margined. The nutlets of the species of *Cynoglossum* which is common in the Bombay Presidency have a very conspicuous margin, and that plant is in my opinion *Cynoglossum denticulatum* var. *zeylanica*, C. B. Clarke.

8. **PARACARYUM,** Boiss.

Perennial or biennial hairy herbs. Leaves alternate. Flowers small, blue or violet, pedicellate or subsessile, in elongate usually ebracteate racemes sometimes laxly and widely paniculate. Calyx deeply 5-fid or 5-partite, not or rarely enlarged in fruit. Corolla infundibuliform; tube short or rather long, the throat closed with obtuse scales; lobes 5, imbricate, obtuse, short, erect or spreading. Stamens 5, inserted on the corolla-tube; filaments short; anthers oblong, obtuse, included or the tips sometimes slightly exserted. Ovary 4-lobed; lobes distinct from a flat receptacle; ovules attached to the inner angle. Nutlets 4 (2 sometimes suppressed), depressed on the back, the face and inner keel almost entirely attached to the whole conical or columnar carpophore, their apices scarcely prominent and their bases hardly produced downwards, usually girt with a membranous usually inflexed, dentate, crested or glochidiate (rarely entire) margin, the backs glochidiate within the margin (except in *P. Lambertianum*).—DISTRIB. S. Europe, W. and Central Asia; species about 20.

The difference between this genus and the genus *Cynoglossum* is so slight and ill-defined that their separation is a matter of no small difficulty. Sir J. D. Hooker makes the following remarks on the subject [Bot. Mag. (1897) t. 7520]: "The genus *Paracaryum* is distinguished from the typical species of *Cynoglossum* by the nutlets of the fruit being more erect on the gynobase and their bases not being rounded or subacute, characters of scarcely appreciable value and which may possibly disappear on a revision of the genera of *Borragineæ*."

Nutlets glochidiate.	
Stems red; flowers pale blue with a darker centre	1. *P. cœlestinum.*
Stems green; flowers dark blue, uniform in color without a darker centre	2. *P. malabaricum.*
Nutlets not glochidiate	3. *P. Lambertianum.*

1. **Paracaryum cœlestinum,** *Benth. in Gen. Pl.* v. 2 (1876) p. 850 (in *adnot.*). Erect, branched, 3–5 ft. high; stem and branches red, the younger pubescent, the older glabrous. Leaves submembranous: radical very large reaching sometimes 9 by 7 in., broadly ovate, acute, entire, wrinkled, with a few scattered hairs above, glabrous except on the nerves beneath, deeply cordate at the base and with red channelled petioles reaching nearly 1 ft. long; lower cauline leaves reaching 6 by 4 in., the leaves becoming smaller upwards, the upper 2–4 by $\frac{3}{4}$–2 in., ovate, acute, cuneate at the base, more or less scabrid on their upper surfaces with short hairs often arising from bulbous bases, the lower surfaces usually glabrous except the nerves, the petioles short, often obscure, gradually diminishing upwards till the upper leaves are sessile. Flowers in ebracteate, hairy, often twice-forked racemes; pedicels very short. Calyx $\frac{1}{6}$ in. long, softly hairy, slightly enlarged in fruit; lobes $\frac{1}{8}$ in. long, ovate, obtuse, ciliate. Corolla $\frac{1}{4}$ in. long, pale blue with a darker centre, often tinged with pink; tube about equalling the suborbicular spreading lobes; scales in the mouth of the tube

notched at the apex. Anthers $\frac{1}{20}$ in. long, oblong, included; filaments short. Ovary deeply 4-lobed; style $\frac{1}{16}$ in. long; stigma small, capitate. Fruit pyramidal; nutlets 4, broadly ovate, acute, $\frac{1}{6}$ in. long, with nearly erect prominent margins and with hooked bristles along the margins and on the faces between. Fl. B. I. v. 4, p. 160; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170. *Cynoglossum cœlestinum*, Lindl. Bot. Reg. (1839) t. 36; Dalz. & Gibs. p. 173. *Echinospermum cœlestinum*, Wight, Icon. t. 1394.—Flowers: Oct.–Nov. VERN. *Nisurdhi.*

KONKAN: *Law*!, *Stocks*!; Vingorla, *Dalzell & Gibson.* DECCAN: Khandala, *Cooke*!; Mahableshwar, very common, *Cooke*!, *Woodrow, H. M. Birdwood.* S. M. COUNTRY: Belgaum, *Ritchie*, 492! KANARA: *Law*!—DISTRIB. India (W. Peninsula).

2. **Paracaryum malabaricum,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 160. Erect, branched, 1–3 ft. high; stems smooth below, strigose above, usually green, but sometimes tinged with brownish-red. Radical leaves broadly ovate or deltoid, acute, cordate at base with a very wide sinus with petioles 6–12 in. long, the upper surface strigose with hairs arising from bulbous bases (which are white when dry), the lower surface clothed with dense hairs on the prominent reticulate nerves and veins. Cauline leaves gradually becoming smaller towards the inflorescence, ovate, acute not cordate, the lower petiolate, the petioles becoming shorter till the leaves are at last sessile, the lower cauline leaves cuneate, the uppermost usually rounded at the base, all reticulately veined, strigose with hairs from bulbous bases on the upper side, and densely hairy with spreading hairs on the nerves and veins beneath. Flowers in numerous terminal racemes forming a dense corymb; pedicels always present but short. Calyx $\frac{1}{5}$–$\frac{1}{4}$ in. long in flower, appressedly hairy; lobes $\frac{1}{6}$ in. long, enlarged to nearly $\frac{1}{4}$ in. in fruit, ovate, subacute, densely ciliate. Corolla nearly $\frac{1}{2}$ in. long, of a fine uniform blue, much darker than the last species, with slightly darker veins but without a darker centre. Anther-tips just exserted beyond the top of the corolla-tube. Style $\frac{1}{6}$ in. long; stigma minute. Fruit pyramidal, of 4 nutlets; nutlets ovoid, acute, nearly $\frac{1}{4}$ in. long, with a prominent erect or incurved margin, glochidiate on the faces, margins and all over with very short, stout, hooked prickles. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.—Flowers: Oct.–Nov. VERN. *Kálanisurdhi.*

DECCAN: abundant at Mahableshwar in the open space near the Dharamsala, *Cooke*!; on the bund of the lake at Mahableshwar, *Cooke*!, *H. M. Birdwood.* KANARA: *Law*!—DISTRIB. India (W. Peninsula), apparently endemic.

3. **Paracaryum Lambertianum,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 161. Erect, 1–3 ft. high; stems stout, the lower part nearly smooth, the upper part rough, green; young branches densely clothed with appressed hairs. Leaves light-green, lanceolate, acute, clothed on the upper surface with short hairs from bulbous bases and with soft hairs on the prominent and numerous nerves and veins beneath: radical leaves 4–6 by 2–3 in., with petioles varying in length from $2\frac{1}{2}$–5 in., base cuneate, decurrent into the petiole; cauline leaves with narrowed bases, sessile, except some near the base of the stem which are more or less shortly petiolate. Flowers pedicellate in forked ebracteate racemes (in appearance like those of *P. cœlestinum*); rhachis and pedicels softly hairy, the latter short. Calyx softly hairy, $\frac{1}{5}$–$\frac{1}{4}$ in.

long at flowering time; lobes $\frac{1}{6}$ in. long in flower, enlarged to more than $\frac{1}{4}$ in. in fruit, ovate-oblong, obtuse, ciliate. Corolla pale-blue with darker centre; tube $\frac{1}{8}$ in. long; lobes $\frac{1}{5}$–$\frac{1}{4}$ in. long, suborbicular; scales fleshy, shortly bifid, puberulous. Anthers not exserted. Style stout, $\frac{1}{16}$ in. long, conical; stigma capitate. Nutlets usually 2 (2 others suppressed in numerous growing specimens examined at Mahableshwar), reaching $\frac{1}{2}$ by $\frac{7}{16}$ in. (including the margin, which is sometimes $\frac{1}{16}$ in. broad), broadly ovate, flattened, not glochidiate on the margins or faces, the margin entire, flat, extending in the same plane as the face or very slightly curved upwards. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.—Flowers: Oct.–Nov.

DECCAN: abundant at Mahableshwar on the cliff opposite the Dhobi's waterfall below the bungalow known as General Barr's, *Cooke*!; Fitzgerald Ghát, below Mahableshwar, *H. M. Birdwood.*—DISTRIB. India (W. Peninsula), apparently endemic.

Paracaryum asperum, Stocks, in Kew Journ. Bot. v. 4 (1852) p. 175. Erect, 1–2 ft. high; stems leafy. Leaves lanceolate, acute; the radical (including the petiole) 3–6 by $\frac{3}{8}$–$\frac{1}{2}$ in.; the cauline linear, sessile. Flowers distant, in elongate panicles; pedicels erect. Calyx $\frac{1}{8}$–$\frac{1}{6}$ in. long. Corolla of a fine violet-blue, $\frac{1}{3}$ in. long.

This plant is given by Stocks as occurring in Upper Beluchistan. Woodrow, in Journ. Bomb. Nat. v. 12 (1898) p. 170, mentions that it has been found by Sir Evan James on the Kirthar mountains which divide Sind from Beluchistan, but the precise locality has not been mentioned, so that it is not known whether the plant exists in Sind or not. I have not seen any specimens from Sind, those in Herb. Kew. collected by Stocks and Lace being from Beluchistan.

9. **SERICOSTOMA,** Stocks.

Much-branched often cano-tomentose undershrubs. Leaves small, alternate. Flowers small, axillary, sessile, solitary, or the upper arranged in a bracteate raceme. Calyx 5-fid or sub-5-partite; lobes narrow, enclosing the nutlets in fruit. Corolla-tube short, the throat without scales, but nearly or entirely closed by hairs; lobes 5, imbricate, obtuse, spreading. Stamens 5, inserted on the corolla-tube, subincluded; filaments short; anthers oblong, obtuse. Ovary distinctly 4-lobed; ovules erect; style short; stigma dilated or annulate, often with a prominent central apiculus. Nutlets 4 (2 sometimes suppressed), ovoid or shortly acuminate, erect, substipitate; scar basal; receptacle flat. Seeds straight; cotyledons ovate, flat.—DISTRIB. W. Asia from India to Arabia; species 3.

1. **Sericostoma pauciflorum,** *Stocks, in Wight Icon.* (1850) t. 1377. A small straggling undershrub 6–18 in. high; stems woody at the base, decumbent, and, as well as the herbaceous branches, clothed with short appressed hairs. Leaves variable in size (larger when growing near the sea than inland), $\frac{1}{4}$–$1\frac{1}{4}$ by $\frac{1}{16}$–$\frac{1}{4}$ in., sessile, linear-lanceolate, subobtuse, clothed with stiff appressed hairs usually from bulbous bases. Flowers in short 2–5-flowered subscorpioid leaf-opposed racemes with a terminal bract, the flowers shortly pedicellate, one of them remote. Calyx at flowering time $\frac{1}{6}$ in. long, clothed with appressed hairs; lobes $\frac{1}{16}$ in. long, the 2 outer larger than the other 3, lanceolate, acute, enlarged to

$\frac{1}{5}$ in. in fruit, ciliate. Corolla white, $\frac{1}{6}$ in. long; tube broad, somewhat infundibuliform, densely clothed with silky hairs in the throat, which radiate towards the centre and quite close the entire corolla; lobes equalling the tube, oblong, rounded at the apex, slightly crisped on the margin, strongly veined. Stamens inserted at the sinuses of the corolla; filaments very short; anthers about $\frac{1}{24}$ in. long, oblong, at length exserted beyond the corolla-lobes. Ovary 4-lobed; style $\frac{1}{24}$ in. long, cylindric, slender; stigma capitate, sub-2-lobate. Nutlets $\frac{1}{10}$ in. long, usually 2, with a short sublateral stalk, keeled or angled on the ventral face, rounded and granular on the back, acuminate at the apex, longer than the style, but shorter than the closed persistent calyx. Fl. B. I. v. 4, p. 175; Dalz. & Gibs. p. 172; Hook. Icon. t. 804; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.—Flowers: Nov.–Dec.

Gujarat: Baikar near Deesa, *Stocks*, 61!; Broach, *Kanitkar*!; coast of Kathiawar, very common, *Dalzell*!; Veráwal (Kathiawar), *Woodrow*; Pahlanpur, *Woodrow*. Sind: *Stocks*, 473!; Jemadar ka Landa near Karachi, *Stocks*, 61!; Karachi, *Vicary*! —Distrib. India (W. Peninsula), apparently endemic.

10. **ARNEBIA,** Forsk.

Annual or perennial erect or diffuse hispid herbs; root often staining red. Leaves alternate. Flowers dimorphic, yellow or violet, sessile or very shortly pedicellate, in simple racemes or spikes or slightly branched cymes; bracts foliaceous. Calyx deeply 5-fid or 5-partite; lobes lanceolate or linear, not or slightly enlarged in fruit. Corolla-tube slender, straight, the throat naked inside; lobes 5, imbricate, obtuse, spreading. Stamens 5, much below the mouth of the tube in the long-styled, or in the throat and $\frac{1}{2}$-exserted in the short-styled forms; anthers small, oblong, obtuse. Ovary deeply 4-lobed; ovules erect, with short funicles; style filiform, 2-partite; stigmas capitate. Nutlets usually 4 (rarely fewer by abortion), erect, oblong or acuminate from a broad base, rugose or more or less tuberculate; scar basal, large, triangular, flat, shortly produced up the inner face.—Distrib. N. Africa, W. & Central Asia; species about 12.

Calyx-lobes linear-subulate, nearly $\frac{1}{2}$ in. long; corolla with purple spots at the base of the lobes ..... 1. *A. Griffithii.*
Calyx-lobes lanceolate, $\frac{1}{4}$ in. long; corolla without purple spots at the base of the lobes ..... 2. *A. hispidissima.*

1. **Arnebia Griffithii,** *Boiss. Diagn.* sér. ii. n. 3 (1856) p. 135. A small annual 3–6 in. high, hirsute with white spreading hairs mostly from bulbous bases. Leaves reaching 2 by $\frac{1}{4}$ in., oblong or oblong-lanceolate, sessile, obtuse or subacute, densely hairy on both sides with stiff hairs from bulbous bases. Flowers dimorphic, secund, in racemes or spikes 1–3 in. long; pedicels 0–$\frac{1}{10}$ in. long. Calyx densely hairy, nearly $\frac{1}{2}$ in. long, divided to the base or nearly so; segments linear-subulate. Corolla yellow with 5 purple spots at the base of the lobes which fade as the flowers grow old, and which are considered in Afghanistan to be the impression of the 5 fingers of the prophet Mahomet: tube $\frac{2}{3}$ in. long, a little swollen from the middle upwards and then slightly constricted below the hypocrateriform limb, which is about $\frac{1}{4}$ in. long; lobes $\frac{1}{6}$ in. long, suborbicular. Anthers $\frac{1}{16}$ in. long, oblong; filaments very short. Style slender, very long in the long-

styled flowers, 2-partite; stigmas suborbicular, flattened. Nutlets 4, triangular in horizontal cross-section, acuminate, rugose, hardly tuberculate, $\frac{1}{10}$ in. long. Fl. B. I. v. 4, p. 176; Boiss. Flor. Orient. v. 4 (1879) p. 213; Bot. Mag. t. 5266.

This species has been included on the authority of the Flora of Br. India, in which Col. Thompson is stated to have obtained the plant from Sind. There is in Herb. Kew. a paper capsule containing a few fragments of the plant, and "Sind Col. Thompson" appears in pencil on the outside. Col. Thompson, who commanded the 7th Dragoon Guards at *Sealkote*, sent seeds of the plant to Kew, from which specimens were grown and figured in Bot. Mag. l. c. It is very doubtful if Col. Thompson ever was in Sind, and the specimen alluded to has not been authenticated by his signature.—DISTRIB. India (Panjáb); Beluchistan, Afghanistan.

2. **Arnebia hispidissima,** *DC. Prodr.* v. 10 (1846) p. 94. Annual or biennial 3–15 in. high, diffusely branched from a woody base, clothed all over with long white spreading stiff hairs often from bulbous bases. Leaves sessile, $\frac{3}{4}$–2 in. (rarely longer) by $\frac{1}{10}$–$\frac{1}{4}$ in., linear-lanceolate, subobtuse, clothed with stiff white hairs from bulbous bases. Flowers dimorphic, in dense secund racemes or spikes; pedicels very short or 0; bracts foliaceous, $\frac{1}{5}$–$\frac{1}{3}$ in. long, linear-lanceolate, densely hispid. Calyx $\frac{1}{4}$ in. long, very hispid, divided to the base or nearly so; segments lanceolate, acute, unequal. Corolla yellow, pubescent outside; tube $\frac{1}{3}$ in. long, slender, lobes $\frac{1}{10}$ in. long, oblong, obtuse. Stamens inserted much below the mouth of the corolla in the long-styled, at or in the throat and $\frac{1}{2}$-exserted in the short-styled forms; anthers $\frac{1}{20}$ in. long, oblong; filaments very short. Style slender, 2-partite; stigmas small, flattened on the inside, rounded on the outside. Nutlets 4, very small, $\frac{1}{20}$–$\frac{1}{16}$ in. long, triangular in horizontal cross-section, acute, tuberculate on all sides. Fl. B. I. v. 4, p. 176; Wight, Icon. t. 1393; Boiss. Flor. Orient. v. 4, p. 213; Aitch. Pb. & Sind Pl. p. 96: C. B. Clarke, in Journ. Linn. Soc. v. 18, p. 524; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.—Flowers: Mar.

GUJARAT: Pahlanpur, *Woodrow*. SIND: *Cooke*!, *Bhola Puran*!, *Stocks*, 417!, *Dalzell*!; Mulir, *Woodrow*!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. W. Asia to Egypt and Nubia.

The roots are imported into Bombay and used as a substitute for *Alkanet*.

ORDER LXXXVIII. CONVOLVULACEÆ.

Herbs or shrubs often twining (rarely trees). Leaves alternate, petiolate, usually exstipulate (0 in *Cuscuta*). Flowers regular, usually hermaphrodite, various in size and color, often showy, solitary or in pedunculate axillary bracteate cymes. Calyx free, often persistent, 5-partite; segments equal or unequal, usually distinct to the base, sometimes accrescent. Corolla campanulate, infundibuliform or rotate, often plicate in bud, entire or shortly lobed. Stamens 5, inserted in the corolla-tube opposite the sepals; anthers 2-celled, dorsifixed, linear or oblong, dehiscing longitudinally. Ovary superior, 1–4-celled, rarely with almost distinct carpels; ovules 2, less commonly 1 or 4 in each cell; style filiform, simple or forked; stigma capitate, 2-lobed or stigmas 2. Fruit capsular or indehiscent, or circumscissile or irregularly breaking up. Seeds as many as the ovules or fewer; albumen scanty or 0; cotyledons usually broad and much folded (obscure or 0 in

Cuscuta).—DISTRIB. Throughout the world, more abundant in the warmer regions; genera 42; species about 800.

Corolla-tube usually uniformly enlarged from base to apex, the 5 bands rarely clearly defined from the intervening spaces; pollen not echinulate.
- Yellow parasitic leafless twining herbs ..... 1. CUSCUTA.
- Green non-parasitic leafy herbs or shrubs.
  - Fruit indehiscent; style 0 ..... 2. ERYCIBE.
  - Fruit dehiscent, or, if indehiscent, small, with thin fragile walls; style or styles present.
    - Sepals much enlarged in fruit; capsule 1-seeded, indehiscent or rarely 2-valved ..... 3. PORANA.
    - Sepals not or slightly enlarged in fruit; capsule valvate or opercular, rarely dehiscing irregularly.
      - Styles 2, free or partly united below.
        - Capsule sessile in the middle of a large flat bract ..... 4. NEUROPELTIS.
        - Capsule not sessile in the middle of a large bract.
          - Corolla-lobes imbricate; flowers axillary, solitary; styles 2, quite free; stamens exserted ..... 5. CRESSA.
          - Corolla-lobes induplicate-contorted; flowers cymose; stamens not exserted.
            - Capsule 4-valved; styles free, each 2-branched; stigmas on inner face of style-arms ..... 6. EVOLVULUS.
            - Capsule irregularly dehiscent; styles usually partly united below, not branched above; stigmas 2, capitate ..... 7. BREWERIA.
      - Styles entire; stigmas usually 2.
        - Ovary 1-celled; capsule 4-valved, 3-seeded; stigmas short, oblong ..... 8. HEWITTIA.
        - Ovary 2 (sometimes 4)-celled.
          - Outer sepals larger than the inner and decurrent on the pedicel; stigmas capitate ..... 9. ANISEIA.
          - Outer sepals not larger than the inner, not decurrent on the pedicel.
            - Stigmas elongate.
              - Stems erect or prostrate, rarely twining; stigmas oblong or linear; capsule 4-valved ..... 10. CONVOLVULUS.
              - Stems twining, rarely prostrate; stigmas elliptic; capsule usually 8-valved. 11. JACQUEMONTIA.
            - Stigmas globose.
              - Capsule 4-valved; stems not winged ..... 12. MERREMIA.
              - Capsule operculately dehiscent; stems winged ..... 13. OPERCULINA.

Corolla-tube not uniformly enlarged from base to apex, the 5 bands on the lobes clearly defined by 2 prominent lines; pollen echinulate.
- Fruit dehiscent, or, if indehiscent, then with thin fragile walls.
  - Corolla more or less campanulate; sepals never aristate; stamens not exserted ..... 14. IPOMŒA.

Corolla more or less hypocrateriform; sepals usually aristate; stamens exserted ..... 15. CALONYCTION.
Fruit indehiscent, woody, mealy or fleshy.
Fruit woody; corolla hypocrateriform; stigmas elliptic-oblong ..... 16. RIVEA.
Fruit mealy or fleshy; corolla not or very rarely hypocrateriform; stigmas globose.
Ovary 4-celled ..... 17. ARGYREIA.
Ovary 2-celled ..... 18. LETTSOMIA.

1. CUSCUTA, Linn.

Leafless yellow or reddish, twining, parasitic annuals. Stems slender, sometimes filiform. Flowers small, white or rose-colored, sessile or pedicellate, solitary or in lateral fascicles or short racemes; bracts small or 0. Calyx usually deeply divided; segments 5 (rarely 4), distinct or connate at the base, subequal. Corolla campanulate, ovoid or globose, usually with fimbriate or lobed scales near the base or below the stamens within; lobes 5 or 4, short, imbricate in bud. Stamens 5 or 4, inserted in or below the throat of the corolla-tube; filaments short; anthers short, obtuse, partially exserted. Ovary perfectly or imperfectly 2-celled; ovules 2 in each cell; styles 1 or 2; stigmas 2. Capsule globose or ovoid, dry or succulent, circumscissile or irregularly breaking up, 4–2-seeded. Seeds glabrous; albumen fleshy; embryo slender, spiral; cotyledons 0 or obscure.—DISTRIB. Warm and temperate regions; species 80.

Style 1, short, stout; stigmas ovoid, thick and fleshy ..... 1. *C. reflexa.*
Styles 2, distinct, elongate, slender; stigmas capitate.
Scales on the corolla-tube 0 ..... 2. *C. hyalina.*
Scales on the corolla-tube fimbriate ..... 3. *C. chinensis.*

1. **Cuscuta reflexa,** *Roxb. Cor. Pl.* v. 2 (1798) p. 3, t. 104. Stems very long, rather stout, closely twining, branched, glabrous, pale greenish-yellow, sometimes dotted with red. Flowers solitary or in umbellate clusters of 2–4 or in short racemes; pedicels short, glabrous, usually curved (rarely 0); bracts $\frac{1}{16}$ in. long, ovate-oblong, obtuse, fleshy. Calyx divided almost to the base; lobes $\frac{1}{8}$ in. long, slightly unequal, broadly ovate, obtuse, glabrous, fleshy. Corolla white; tube $\frac{1}{4}$–$\frac{1}{3}$ by $\frac{1}{6}$ in., almost cylindric; lobes $\frac{1}{10}$–$\frac{1}{8}$ in. long, deltoid, acute, reflexed; scales almost at the base of the corolla-tube, large, oblong, subquadrate or somewhat obovate, fimbriate and incurved at the apex. Stamens in the throat of the corolla-tube; filaments scarcely any; anthers about $\frac{1}{2}$-exserted beyond the top of the corolla-tube. Ovary ovoid; style simple, very short and thick; stigmas 2, distinct, large, thick and fleshy, $\frac{1}{16}$ in. long, ovoid. Capsules $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., depressed-globose, glabrous, circumscissile near the base. Seeds 2–4, large, black, glabrous. Fl. B. I. v. 4, p. 225; Grah. Cat. p. 134; Hook. Exot. Fl. t. 150; Trim. Fl. Ceyl. v. 3, p. 229; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Engelm. Cuscut. p. 68; Watt, Dict. Econ. Prod. v. 2, p. 671.—Flowers: Jan.–Feb. VERN. *Amarvel; A'káshvel.*

KONKAN: *Stocks*!, *Dalzell*! S. M. COUNTRY: Dharwar, *Woodrow*! GUJARAT: common, *Vaupel* ex *Graham.*—DISTRIB. Throughout India; Ceylon, Malaya.

The stems and seeds have some repute in native medicine. See Watt, Dict. Econ. Prod. l. c.

2. **Cuscuta hyalina,** *Roth, Nov. Pl. Sp.* (1821) p. 100 (*not* of Wight). Stems very slender, closely twining, much-branched, forming often a tangled mass. Flowers in fascicles or in shortly pedunculate cymes or racemes; pedicels 0–$\frac{1}{5}$ in. long; bracts $\frac{1}{8}$ in. long, lanceolate, acute. Calyx $\frac{1}{8}$ in. long, divided rather more than $\frac{1}{2}$-way down; lobes 5 (rarely 4), ovate, acute or acuminate, slightly unequal. Corolla $\frac{1}{8}$ in. long, 5 (rarely 4)-lobed; lobes $\frac{1}{12}$ in. long, ovate-lanceolate, very acute, or acuminate; scales 0. Filaments distinct, $\frac{1}{40}$–$\frac{1}{30}$ in. long. Styles 2, slender, distinct, $\frac{1}{16}$ in. long. Capsules $\frac{1}{10}$ in. in diam., subglobose, membranous, irregularly breaking up from the base. Seeds 2–4, ovoid or suborbicular, compressed, $\frac{1}{16}$ in. in diam., crowned by the persistent styles. Fl. B. I. v. 4, p. 226; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Engelm. Cuscut. p. 40. *Cuscuta arabica*, Wight, Icon. t. 1371 (*not* of Fresen.). *C. oxypetala*, Boiss. Diag. sér. ii, v. 3, fase. 3, p. 130; Aitch. Pb. & Sind Pl. p. 101.—Flowers: June–Aug. VERN. *Ambar.*

In the Bombay Presidency apparently confined to Sind. SIND: *Wight*!, *Woodrow, Bhola Puran*, 164!; Magar Pir, *Kanitkar*!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (W. Peninsula); Beluchistan, Abyssinia.

3. **Cuscuta chinensis,** *Lamk. Encyc. Méthod.* v. 2 (1786) p. 229. Stems filiform, twining, much-branched, often forming a tangled mass. Flowers solitary or in shortly pedunculate cymes; pedicels short; bracts ovate, $\frac{1}{20}$ in. long. Calyx $\frac{1}{10}$ in. long, divided rather less than $\frac{1}{2}$-way down; lobes deltoid-ovate, subobtuse, often with a tubercular keel on the back. Corolla $\frac{1}{10}$ in. long; lobes about equalling the tube, ovate-oblong, subobtuse; scales at the base of the filaments fimbriate. Filaments $\frac{1}{30}$ in. long. Styles 2, distinct, $\frac{1}{25}$ in. long. Capsules hardly $\frac{1}{10}$ in. in diam., globose, hyaline, divided into 2 lobes by a deep furrow on top. Seeds $\frac{1}{16}$ in. long, usually 4. Fl. B. I. v. 4, p. 226; Wight, Icon. t. 1373; Trim Fl. Ceyl. v. 3, p. 229; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Engelm. Cuscut. p. 29. *Cuscuta sulcata*, Roxb. Hort. Beng. p. 12; Grah. Cat. p. 134.—Flowers: June–July.

Not common. DECCAN: Poona, *Cooke*!; Nasik, *Vadekar*!—DISTRIB. Throughout the greater part of India; Ceylon, Persia, Australia.

2. **ERYCIBE,** Roxb.

Scandent or rambling shrubs (rarely trees). Leaves alternate, entire, coriaceous. Flowers small, in axillary or terminal racemes or panicles; bracts small, lanceolate. Sepals subequal, orbicular, coriaceous, appressed to the base of the fruit. Corolla white or yellowish; tube shortly campanulate, hairy outside; limb plaited in bud; lobes 5, imbricate, each lobe deeply cut into 2 induplicate plaited segments, so that the limb appears 10-lobed. Stamens 5, subincluded, inserted on the corolla-throat; filaments short; anthers ovate-lanceolate. Ovary 1-celled; ovules 4; style 0; stigma large, subglobose or conic, 5- or 10-ridged. Fruit a berry, ovoid or ellipsoid. Seed solitary, glabrous; albumen scanty, intruded between the folds of fleshy cotyledons; radicle inferior.—DISTRIB. Asia and Tropical Australia; species about 12.

1. **Erycibe paniculata,** *Roxb. Cor. Pl.* v. 2 (1798) p. 31, t. 159. A large scandent shrub; branches long, flexuose, more or less angular,

covered when young with reddish-brown tomentum. Leaves 3–5 by 1½–2½ in., elliptic-oblong or obovate-oblong, suddenly acuminate, glabrous or nearly so, base acute; main nerves arcuate, 4–6 pairs; petioles ¼–½ in. long. Flowers numerous, yellow, in terminal (less commonly axillary) panicles often reaching 6 or 7 in. long, densely clothed with reddish-brown tomentum; buds globose; pedicels ⅛–¼ in. long. Calyx divided to the base, covered outside with dense reddish-brown, more or less stellate pubescence; sepals ⅛ in. long, orbicular, strongly ciliate. Corolla ⅓ in. long, ½ in. or more across when expanded; tube ⅙ in. long, broadly infundibuliform; lobes 5, fleshy or leathery, each deeply divided at the apex into 2 obtuse lobules, hairy on the back below the division with reddish-brown hairs, the margins plaited and slightly sinuate. Stamens inserted near the base of the corolla-tube; filaments short, broad at the base, flattened; anthers with a long curved apiculation. Berry about ½ in. long, ellipsoid, supported on the persistent sepals, black and pulpy when ripe. Fl. B. I. v. 4, p. 180; Grah. Cat. p. 137; Dalz. & Gibs. p. 169; Wight, Ill. t. 180; Trim. Fl. Ceyl. v. 3, p. 205; Talb. Trees, Bomb. ed. 2, p. 247; Watt, Dict. Econ. Prod. v. 3, p. 268.—Flowers: Apr.

Konkan: *Nimmo* ex *Graham, Dalzell & Gibson.*—Distrib. Throughout India; Ceylon, the Nicobars.

Var. *Wightiana*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 181. Leaves much reticulately veined beneath. Flowers white, fragrant. Talb. Trees, Bomb. ed. 2, p. 247; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170. *Erycibe Wightiana* (sp.), Grah. Cat. Bo. Pl. (1839) p. 137; Dalz. & Gibs. p. 170.—Flowers: Nov.

More common than the type *E. paniculata* in the Bombay Presidency. *Dalzell* without locality in Herb. Kew. S. M. Country: Rámghát; *Gibson, Ritchie*, 1907!; Castlerock, *Woodrow*.

3. **PORANA,** Burm.

Large climbers. Leaves petiolate, ovate, entire. Flowers white, blue or purple, in cymes which are often extensively paniculate; bracts persistent; bracteoles subulate, or 0. Sepals 5, small and narrow in flower, in fruit the 3 outer or all much enlarged, membranous, spreading, nerved. Corolla campanulate or infundibuliform, usually small with a wide or narrow mouth; limb 5-plaited, subentire or lobed. Stamens 5, subincluded; filaments filiform or linear. Ovary 1- or 2-celled; ovules 2 or 4; style long or short, entire or 2-fid with a single 2-lobed or with 2 capitate stigmas. Capsule globose, oblong or obconic, membranous, indehiscent or 2-valved, 1-seeded. Seed glabrous; cotyledons plicate.—Distrib. East Indies, Malay Archipelago, and Australia; species about 10.

1. **Porana malabarica,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 223. An extensive climber; stems and branches slender, glabrous or nearly so. Leaves 2½–5 by 1½–4½ in., ovate, deeply cordate, acuminate, very acute, thin, with a few scattered hairs above, glabrous or nearly so and reticulately veined beneath; petioles ½–3 in. long, slender, glabrous or nearly so. Flowers white, in lax racemes or panicles; bracts at the forks large, leafy, cordate, persistent, those of the pedicels smaller upwards, the uppermost linear; pedicels slender, ¼–⅓ in. long. Sepals ⅛–⅙ in. long, more or less pubescent, narrowly

ovate-oblong, subacute when in flower, all much and almost equally enlarged up to ¾ by ⅜ in. or even more when in fruit, often tinged with pink, glabrous, persistent, strongly nerved and reticulately veined between the nerves. Corolla rather more than ½ in. long, divided about ½-way down into 5 ovate acute lobes. Stigma shortly 2-lobed. Capsules ⅜ in. long, subcylindric, scarious, slightly depressed at the apex round a raised somewhat pyramidal centre. Seed ¼ in. long, oblong, reddish-brown, glabrous. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Peter, in Engl. & Prantl, Pflanzenf. v. 4, 3 A, p. 24, fig. 11, C; Watt, Dict. Econ. Prod. v. 6, part 1, p. 328. *Porana racemosa*, Grah. Cat. p. 133 (*not* of Roxb.); Dalz. & Gibs. p. 162.—Flowers: Oct. VERN. *Bhauri.*

KONKAN: *Stocks*!, *Law*!; Matheran, *H. M. Birdwood.* DECCAN: Párghát, *Dalzell*!; Mahableshwar, *Cooke*!, *H. M. Birdwood*; Panchgani, *Woodrow*!—DISTRIB. India (W. Peninsula).

Porana paniculata, Roxb. Cor. Pl. v. 3 (1819) p. 31, t. 235, is a powerful climber cultivated in gardens. Its small white flowers occur in large panicles terminating every branchlet with innumerable flowers which give the plant the appearance of being covered with snow. In Poona the panicles of flowers are used effectively for table decoration. The plant is not indigenous in the Bombay Presidency, but is so in many parts of India. Fl. B. I. v. 4, p. 222; Firminger, Man. Gard. ed. 3, p. 509.—Flowers: Sept.–Oct.

4. **NEUROPELTIS,** Wall.

Large scandent shrubs, glabrous except the inflorescence which is usually rufous-tomentose or rufous-pubescent. Leaves alternate, coriaceous, petiolate. Flowers small, numerous, pedicellate, in racemes which are axillary or subpaniculate towards the ends of the branches; bract under the calyx inconspicuous in flower, much enlarged in fruit. Sepals suborbicular, subequal, scarcely enlarged in fruit. Corolla broadly campanulate, deeply 5-fid; lobes induplicate-valvate in bud. Stamens attached near the base of the corolla, exserted or included; filaments filiform; anthers oblong. Ovary imperfectly 2-celled, 4-ovulate; styles 2, distinct, short, thick; stigmas large, globose. Capsule globose, 4-valved, 1-seeded, sessile or shortly stalked, almost in the middle of the flat enlarged bract. Seed globose, glabrous, albuminous; cotyledons plicate.—DISTRIB. Species 2, the following and an African one.

1. **Neuropeltis racemosa,** *Wall. in Roxb. Fl. Ind. ed. Carey*, v. 2 (1824) p. 43. A large woody climber; stems glabrous in age. Leaves coriaceous, 3–4½ by 1½–2¼ in., elliptic or ovate-oblong with a long or short acumination, entire, glabrous, base usually acute; main nerves 6–9 pairs; petioles ½–¾ in. long. Flowers in straight rusty-pubescent racemes 2–4 in. long, which are axillary or from the scars of fallen leaves, solitary or 2–3 together; pedicels short, densely rufous-hairy; bract beneath the calyx about ⅛ in. long at flowering time, ovate, acute, densely rufous-hairy; at fruiting time scarious, ultimately glabrous, veined, suborbicular, enlarged to 1–2 in. in diam. with a rounded or

cordate base and rounded or retuse apex. Calyx rufous-hairy; sepals suborbicular, $\frac{1}{10}$ in. long, ciliate. Corolla $\frac{1}{4}$ in. long, divided to a little below the middle, appressedly rufous-villous outside; lobes oblong, obtuse, veined. Ovary rufous-villous. Capsules $\frac{1}{8}$–$\frac{1}{3}$ in. in diam., ovoid or subglobose, glabrous or minutely appressedly silky, situated a little below the middle of the bract on a short pedicel which is more or less wholly or partially adnate to the bract. Seed subglobose, glabrous, black. Fl. B. I. v. 4, p. 225; Wall. Cat. 1322; Bedd. Icon. Pl. Ind. Or. t. 291; Talb. Trees, Bomb. ed. 2, p. 253; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172. *Neuropeltis ovata*, Wall. Cat. 1323; Peter, in Engl. & Prantl, Pflanzenf. v. 4, 3 A, p. 16, fig. 8, A.—Flowers: Jan.–Feb.

In the Bombay Presidency apparently confined to N. Kanara.

KANARA: evergreen forests of the Supa sub-division of N. Kanara, rare, *Talbot*; near Potelli (N. Kanara), *Talbot*, 2735!; Bankeri (N. Kanara), *Woodrow*!; Honaver (N. Kanara), *Woodrow*!—DISTRIB. India (W. Peninsula); Malay Peninsula, Borneo.

5. **CRESSA,** Linn.

Small branched undershrubs, erect or diffuse, usually grey-pubescent. Leaves small, entire. Flowers small, sessile in the upper axils or in terminal clusters or spikes; bracts 2 beneath the calyx, not enlarging in fruit. Sepals 5, subequal, small, not enlarging in fruit, thin, imbricate. Corolla infundibuliform; tube short; lobes 5, distinct, imbricate. Stamens 5, exserted; filaments filiform; anthers oblong. Ovary 2-celled; ovules 2 in each cell; styles 2, distinct from the base, equal; stigmas capitate. Capsule 2–4-valved, 1–4-seeded. Seeds glabrous; cotyledons linear, plicate.—DISTRIB. Warmer regions of the world; species 3.

1. **Cressa cretica,** *Linn. Sp. Pl.* (1753) p. 223. An erect dwarf shrub 6–15 in. high; stem slender, much-branched, very hairy. Leaves numerous, subsessile, $\frac{1}{8}$–$\frac{1}{4}$ by $\frac{1}{16}$–$\frac{1}{10}$ in., ovate, acute, densely silky-hairy. Flowers white or pink, usually in small clusters in the axils of the upper leaves; pedicels very short; bracts 2, linear, hairy, $\frac{1}{10}$ in. long, appressed to the calyx. Calyx densely silky; sepals $\frac{1}{8}$ in. long, elliptic, obtuse, concave, ciliate. Corolla $\frac{1}{5}$ in. long, divided $\frac{1}{2}$-way down; lobes oblong, subobtuse, reflexed, hairy on the back near the tip. Capsules $\frac{1}{6}$–$\frac{1}{5}$ in. long, ovoid, pointed and pubescent at the apex. Seeds in fully ripe capsules usually solitary. Fl. B. I. v. 4, p. 225; Dalz. & Gibs. p. 162; Peter, in Engl. & Prantl, Pflanzenf. v. 4, 3 A, p. 15, fig. 7, D–G; Aitch. Pb. & Sind Pl. p. 98; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Watt, Dict. Econ. Prod. v. 2, p. 588. *Cressa indica*, Retz. Obs. fasc. 4, p. 24; Wight, Ill. t. 168, B, n. 11; Grah. Cat. p. 133.—Flowers: Nov.–Jan. VERN. *Kardi*; *Lona*.

Common in cultivated fields throughout the Presidency in the cold season. KONKAN: *Woodrow*! DECCAN: common, *Cooke*! KANARA: *Law*! GUJARAT: *Bhiva*!; Balsár, *Kanitkar*! SIND: *Dalzell*!, *Woodrow*; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. Throughout India; Ceylon and all warm regions.

6. **EVOLVULUS,** Linn.

Small herbs or undershrubs, prostrate or erect, never climbing, often sericeo-pubescent or pilose. Leaves small, entire, often distichous.

Flowers small, white or bluish, axillary, solitary or in few-flowered pedunculate cymes. Sepals 5, subequal, not enlarged in fruit. Corolla infundibuliform or subrotate; limb plicate, subentire. Stamens 5, included or exserted; filaments slender; anthers ovate or oblong. Ovary 2 (rarely 1) -celled; ovules 4; styles 2, distinct from the base, each cleft into 2 linear or subclavate stigmas. Capsule 4-2-valved. Seeds 4 or 2 (rarely solitary); cotyledons twice folded; radicle terete, much incurved.—DISTRIB. Species about 80, in most warm climates, numerous in Brazil.

1. **Evolvulus alsinoides,** *Linn. Sp. Pl.* ed. 2 (1762) p. 392. A perennial herb with a small woody branched rootstock; stems numerous, often more than 1 ft. long, prostrate, spreading, slender, wiry, usually clothed with long spreading hairs, but sometimes quite glabrous. Leaves numerous, $\frac{1}{4}$–$\frac{3}{4}$ by $\frac{1}{6}$–$\frac{1}{3}$ in., elliptic-oblong, obtuse, strongly apiculate, usually acute at the base, densely clothed with appressed silky hairs; petioles very short, sometimes almost 0. Flowers light-blue, solitary, or sometimes 2 from a pair of lanceolate bracts on the peduncle; peduncles very long, filiform, axillary; pedicels filiform. Calyx densely silky; sepals $\frac{1}{6}$ in. long, lanceolate, very acute. Corolla $\frac{1}{5}$ in. long. Capsules $\frac{1}{8}$–$\frac{1}{6}$ in. in diam., globose, thin, 4-valved. Seeds usually 4, glabrous. *Fl. B. I.* v. 4, p. 220; Trim. Fl. Ceyl. v. 3, p. 227; Watt, *Dict. Econ. Prod.* v. 3, p. 305; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; *Aitch. Pb. & Sind Pl.* p. 98. *Evolvulus hirsutus,* Lamk. Encyc. Méthod. v. 3, p. 538; Grah. Cat. p. 133; Dalz. & Gibs. p. 162.—Flowers: July–Nov. VERN. *Vishnukránta*; *Shankaveli.*

Common in grassy places throughout the Presidency, Dalzell & Gibson. KONKAN: Bombay, *Lamberé!* DECCAN: common during the rains in the Deccan plains, *Graham*; Poona, *Cooke!* GUJARAT: Baroda, *Kanitkar!* SIND: *Bhola Puran!*—DISTRIB. Tropical and subtropical countries. Used in Ceylon as a bitter tonic and febrifuge (*Trimen*).

7. BREWERIA, R. Br.

Herbs or undershrubs large and twining or small and erect. Leaves entire. Flowers in axillary pedunculate heads or terminal close panicles, or 1–3 together, sessile and axillary. Sepals equal or unequal, in the Indian species scarcely enlarged in fruit. Corolla campanulate or infundibuliform; limb 5-plaited or very shortly and broadly lobed. Stamens included; filaments filiform, often dilated at the base. Ovary 2-celled; ovules 4; style filiform, equally or unequally 2-fid, or styles 2 free from the base; stigmas capitate. Capsule globose or ovoid, 4-valved, membranous or coriaceous. Seeds normally 4, glabrous or pilose.—DISTRIB. Tropics of both hemispheres, Australia, N. America; species 25.

This genus includes the genus *Seddera*, Hochst.

Note.—Asa Gray (Proc. Am. Acad. v. 5 [1862] p. 337) suggested the reduction of the genus to *Bonamia*, Thouars, a suggestion which Bentham & Hooker (Gen. Pl. v. 2, p. 877) do not accept. The genus *Bonamia*, of which there are only 2 species, was founded by Du Petit-Thouars (Hist. Veg. Isl. Aust. Afr. [1805] p. 17 & p. 32, t. 8), and is distinguished from the genus *Breweria* by its exserted stamens and deeply lobed corolla. The 'Index Kewensis,' both in its original first volume (1895) and in its first supplement (1902), maintains *Breweria* as a separate genus, as does Prof. Peter, in Engl. & Prantl, Pflanzenf. v. 4, 3 A, pp. 14 & 16. There does not seem to be

sufficient reason for the change advocated by Gray, and more recently by Hallier f. (Engl. Jahrb. v. 16, p. 528), which would have the effect of upsetting the nomenclature of 25 species of a genus which has been in existence for upwards of 50 years prior to Gray's suggestion.

Twining; leaves exceeding 1 in. long; flowers large, in pedunculate cymes; styles united for about ½ their length ..... 1. *B. cordata.*
Erect; leaves less than 1 in. long; flowers small, axillary, 1–3 together; styles distinct nearly to the base ..... 2. *B. latifolia.*

1. **Breweria cordata,** *Blume, Bijdr.* (1825) p. 722. Stems stout, twining, terete, densely fulvous-pubescent or tomentose. Leaves 2½–4½ by 1½–3 in., ovate, acuminate, finely pubescent above, densely velvety with fulvous hairs beneath, base cordate with rounded lobes; main nerves 7–9 pairs, prominent; petioles ½–1½ in. long. Flowers pure white, 2–10 (commonly 4 or 5) in rusty-pubescent heads on the tops of terete pubescent peduncles 1–4 in. long; pedicels ⅛–¼ in. long. Calyx silky with fulvous hairs; sepals ⅓–½ in. long, subequal, ovate-oblong, acute or acuminate. Corolla 1–1½ in. long, widely infundibuliform, with 5 hairy narrowly-triangular bands (*mesopetala*) outside; limb subentire. Capsules ½ in. in diam., subglobose, glabrous, surrounded by the slightly enlarged concave sepals. Seeds glabrous, dull-black. Fl. B. I. v. 4, p. 223; Trim. Fl. Ceyl. v. 3, p. 227; Talb. Trees, Bomb. ed. 2, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172. *Breweria Roxburghii,* Choisy, in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 493; Wight, Icon. t. 1370; Dalz. & Gibs. p. 162. *Convolvulus semidigynus,* Roxb. Hort. Beng. (1814) p. 13. *Bonamia semidigyna,* Hallier f. in Engl. Jahrb. v. 16, p. 528, & Monogr. Convolv. in Bull. Herb. Boiss. v. 5, p. 814.—Flowers: Oct.–Dec.

Konkan: Vingorla, *Dalzell!, Kanitkar!*; along the Railway line to Marmagão, *Cooke!, Woodrow!.* Kanara: N. Kanara, rather rare, *Talbot.*—Distrib. India (E. Bengal and W. Peninsula); Ceylon, Malaya.

2. **Breweria latifolia,** *Benth. ex C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 224. A low much-branched erect shrub rarely reaching 1 ft. high; stems and branches argenteo-canescent. Leaves ¼–½ in. long, elliptic-oblong, obtuse, densely silky, base usually acute; petioles ⅒–⅛ in. long. Flowers 1–3 together, sessile in the upper axils; bracteoles 2 beneath the calyx, linear-lanceolate, acute, ⅛ in. long. Calyx silky outside, veined inside; sepals ⅙–⅕ in. long, ovate, acuminate. Corolla scarcely, if at all, exceeding the calyx; limb very shortly 5-lobed, with hairy bands (*mesopetala*) between the folds. Styles free nearly to the base. Capsules ovoid, acute, ⅛ in. long, pubescent near the apex, splitting into 4 valves to the base. Seeds usually 2, dark brown, glabrous, ⅕ in. long. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172. *Seddera latifolia,* Hochst. & Steud. in Flora (1844) Beibl. 8, t. 5, fig. B, C; Aitch. Pb. & Sind Pl. p. 98.—Flowers: Dec.

In the Bombay Presidency confined to Kathiawar and Sind. Gujarat: Verâwal (Kathiawar), *Woodrow.* Sind: *Bhola Puran!, Stocks,* 443!, *Dalzell,* 55!, *Vicary!*; Mulir, *Woodrow*; Jemadar ka Landa near Karachi, *Stocks!*—Distrib. India (Panjâb); Tropical Africa.

8. HEWITTIA, Wight & Arn.

A pubescent twining herb. Leaves cordate, entire, angled or lobed. Flowers axillary, solitary, or in few-flowered cymes; bracts 2 on the

pedicel, linear-lanceolate. Sepals 5, acute, the 3 outer larger, ovate, enlarged in fruit, the 2 inner narrowly lanceolate. Corolla campanulate, yellow or white, with a purple eye; limb plicate. Stamens 5, included; filaments linear, dilated at the base. Ovary hirsute, 1 (or imperfectly 2)-celled; ovules 4; style filiform; stigma of 2 ovate-oblong lobes. Capsules globose, 4-valved, 1-celled. Seeds normally 4, black, glabrous.—DISTRIB. India, Malaya, Tropical Africa; species about 5.

1. **Hewittia bicolor,** *Wight & Arn. in Madras Journ. Lit. & Sc.* v. 5 (1837) p. 22. Stems long, twining or prostrate, pubescent or glabrous. Leaves numerous, rather variable, 2–4 in. long, ovate, sometimes angular or somewhat palmately lobed, acute or obtuse, usually cordate at the base, more or less softly pubescent on both sides; petioles ½–1½ in. long, pubescent. Flowers pale-yellow, with a purple eye, solitary, a few together on the top of a peduncle ½–5 in. long; pedicels short; bracts on the pedicel a little below the calyx ⅓ in. long, linear-lanceolate, herbaceous, hairy. Calyx in flower rather more than ½ in. long, the 3 outer sepals broadly ovate, acute, the 2 inner lanceolate, all softly pubescent and ciliate. Corolla 1 in. long with pubescent bands outside. Ovary clothed with long silky erect hairs; style long, filiform, hairy. Capsules ¼ in. in diam., subglobose, hairy, surrounded by the moderately enlarged sepals. Seeds glabrous. Fl. B. I. v. 4, p. 216; Wight, Icon. t. 835 (by misprint *Heivetia*); Trim. Fl. Ceyl. v. 3, p. 226; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Peter, in Engl. & Prantl, Pflanzenf. v. 4, 3 A, p. 25, fig. 12, B. *Convolvulus bicolor,* Bot. Mag. v. 48, t. 2205. *Shutereia bicolor,* Choisy, in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 486; Grah. Cat. p. 133. *Palmia bicolor,* Endl. ex Dalz. & Gibs. Bo. Fl. p. 163.—Flowers: Nov.

In the Southern districts of the Presidency, not common. KONKAN: *Stocks*!, *Nimmo* ex *Graham*; near Pen, *Dalzell & Gibson*; Savantvádi, *Woodrow*! Marmagão, *Woodrow*!—DISTRIB. India (S.E. and W. Peninsula); Ceylon, Malaya, Tropical Africa.

9. ANISEIA, Choisy.

Twining or prostrate herbs. Leaves ovate or oblong, often mucronulate. Flowers axillary, solitary, or in few-flowered cymes. Sepals 5, herbaceous, acuminate, the outer larger decurrent on the pedicel, slightly enlarged in fruit, the inner lanceolate, not enlarged in fruit. Corolla campanulate or infundibuliform; limb subentire. Stamens 5, included; filaments filiform. Ovary 2-celled, glabrous; ovules 4; style filiform; stigma 2-globose. Capsule 2-celled, 4-valved. Seeds 4.—DISTRIB. Tropical countries pretty widely distributed; species about 15.

1. **Aniseia uniflora,** *Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv.* v. 6 (1834) p. 483, t. 2, fig. 9.—Stems creeping or twining, slender, glabrous or nearly so. Leaves 1½–3 by ½–1 in., oblong, entire, obtuse or emarginate, mucronate, glabrous above, glabrous or more or less pubescent beneath, base acute; petioles ¼–¾ in. long. Peduncles axillary, solitary, with 2 small persistent bracts at the top, from which issues the slender solitary pedicel which is usually shorter than the peduncle. Sepals in flower ⅓–¾ in. long, the outer elliptic, decurrent on the pedicel, ultimately slightly enlarged in fruit, the inner lanceolate.

Corolla campanulate, ¾–1¼ in. long, white, with hairy bands outside. Capsules ½ in. long, ovoid, glabrous, silky within. Seeds black, fringed with a ring of short scaly hairs round the margin, otherwise glabrous. Wight, Icon. t. 850; Grah. Cat. p. 133; Dalz. & Gibs. p. 163. *Aniseia martinicensis*, Choisy, Convolv. Rar. in Mém. Soc. Phys. Genèv. v. 8, part 1 (1838) p. 66. *Ipomœa uniflora*, Rœm. & Sch. Syst. v. 4 (1819) p. 247 (*not* of Blume); C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 201.

Rare. KONKAN: S. Konkan, *Dalzell & Gibson*.—DISTRIB. Throughout India; Malaya, Fiji Islands, Tropical Africa.

10. **CONVOLVULUS,** Linn.

Herbs or undershrubs erect, prostrate or rarely twining, sometimes spinescent. Leaves entire, toothed or lobed. Flowers axillary, solitary or in cymes. Sepals 5, usually subequal. Corolla campanulate or infundibuliform; limb plicate, subentire. Stamens 5, attached near the base of the corolla, included; filaments filiform, often unequal. Ovary 2-celled; ovules 4; style filiform; stigmas 2, linear or oblong, distinct. Capsule 2-celled, 4-valved or irregularly rupturing. Seeds normally 4, glabrous.—DISTRIB. Tropical and temperate climates; species about 160.

Erect undershrubs, not prostrate nor twining.	
Leaves obovate or spathulate, plicate, ¼–½ in. long	1. *C. scindicus.*
Leaves linear, acute, not plicate, 1–2 in. long	2. *C. Rottlerianus.*
Prostrate herbs or undershrubs not twining (except in *C. glomeratus* var. *volubilis*).	
Stigmas filiform.	
Corolla infundibuliform; mouth wide, very shallowly lobed; seeds not tuberculate	3. *C. microphyllus.*
Corolla tubular, deeply lobed; seeds minutely tuberculate	4. *C. rhyniospermus.*
Stigmas clavate or elliptic-oblong	5. *C. glomeratus.*
A twining herb; stems often twisted together	6. *C. arvensis.*

1. **Convolvulus scindicus,** *Stocks, in Kew Journ. Bot.* v. 4 (1852) p. 173 (*not* of Boiss. Diagn. sér. ii. n. 3, p. 123). A much-branched rigid erect bush 1 or rarely 2 ft. high and 2–3 ft. in circumference, with intricate grey or fulvous velvety-tomentose stiff close branches spreading on all sides; branchlets ending abruptly, sometimes spinescent. Leaves small on the flowering branches ¼ by ⅙ in. almost sessile, on the young leafy shoots ½ by ⅓ in. with a petiole ⅙ in. long, obovate or spathulate, entire, plicate, densely velvety, the nerves prominent beneath. Flowers sessile, in congested rufous-hirsute heads at the ends of the branchlets; bracts beneath the calyx ovate-lanceolate, densely hairy. Sepals ¼ in. long, unequal, linear-lanceolate, densely hirsute with long fulvous or rufous hairs. Corolla ½ in. long, white with pink hairy bands (*Stocks*), infundibuliform, the limb with 5 distinct acute lobes. Ovary glabrous. Capsules not seen. Fl. B. Ind. v. 4, p. 217; Boiss. Fl. Orient. v. 4, p. 90; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172. *Convolvulus brachyphyllus*, Boiss. Diagn. sér. ii. n. 3, p. 122.—Flowers: Aug.

In the Bombay Presidency occurs in Sind. SIND: Garra, *Stocks*, 433!; 12 miles east of Bula-Khán, *Woodrow*.—DISTRIB. Beluchistan.

2. **Convolvulus Rottlerianus,** *Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv.* v. 6 (1834) p. 477. Perennial, erect, 9–10 in. high during its first year with scarcely-branched leafy silky-villous stems, afterwards branching, the plant ultimately reaching a height of 18 in. or more. Leaves sessile or very shortly petiolate, 1–2 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear, acute, silky-hairy. Flowers 1–3 in a lax raceme; peduncles axillary, very slender, silky-hairy, ultimately reaching sometimes $1\frac{1}{2}$ in. long or more; pedicels $\frac{1}{10}$–$\frac{1}{5}$ in. long, filiform; bracts 2 beneath each pedicel, $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear-lanceolate, very acute, silky. Sepals $\frac{1}{4}$ in. long, the outer ovate, very acute, hirsute outside, the inner membranous, acuminate, hairy near the apex. Corolla tubular, less than $\frac{1}{2}$ in. long, hairy outside near the top; limb shortly 5-lobed. Stamens unequal. Ovary glabrous; stigmas filiform, $\frac{1}{8}$ in. long. Capsules $\frac{1}{5}$ in. in diam., subglobose, glabrous. Seeds puberulous. Fl. B. I. v. 4, p. 219; Dalz. & Gibs. p. 164; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172.—Flowers: Sept.–Oct.

Rare in the Bombay Presidency. DECCAN: Junnar, *Woodrow*!; Lenyadi Hill (Poona districts), *Kanitkar*!—DISTRIB. India (W. Peninsula); Afghanistan.

VAR. *tenella*, C. B. Carke, in Hook. f. Fl. B. Ind. v. 4, p. 219. Sepals glabrous outside. *Convolvulus tenellus* (sp.), Stocks, in Kew Journ. Bot. v. 4 (1852) p. 172.

Dalzell, no. 57! (without locality). SIND: *Stocks*, 598!—DISTRIB. Beluchistan.

3. **Convolvulus microphyllus,** *Sieb. ex Spreng. Syst.* v. 1 (1825) p. 611. Procumbent or suberect, not twining, fulvous-villous; stems suffruticose at the base, 6–20 in. long, often floriferous from near the base. Leaves $\frac{1}{2}$–1 in. long, linear-oblong or the upper elliptic, obtuse, mucronate, subsessile, villous on both sides, base tapering. Flowers axillary or on short lateral branches, solitary or 2–4 together, sessile or shortly pedunculate; bracts beneath the calyx $\frac{1}{8}$ in. long, linear-lanceolate, hairy. Sepals $\frac{1}{4}$ in. long, ovate-lanceolate, acute, hairy on both sides, the 3 outer slightly broader than the 2 inner. Corolla rose-yellow (*C. B. Clarke*), $\frac{1}{3}$–$\frac{1}{2}$ in. long, infundibuliform, with hairy bands outside; limb shallowly 5-lobed, the lobes deltoid, acute, with a tuft of hair at the apex of each. Stamens unequal. Ovary glabrous, seated on a cup-shaped disk; stigmas $\frac{1}{6}$ in. long, filiform. Capsules ellipsoid or subglobose, $\frac{1}{8}$ in. long, smooth. Seeds $\frac{1}{10}$ in. long, glabrous, scarcely papillose. Fl. B. I. v. 4, p. 218; Wight, Icon. t. 1367; Dalz. & Gibs. p. 164; Boiss. Fl. Orient. v. 4, p. 103; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172.—Flowers: Oct.

Confined in the Bombay Presidency to Gujarat and Sind. GUJARAT: common, *Dalzell*!; Kathiawar, *Chester Macnaghten*!; Porbandar (Kathiawar), *Cooke*! SIND: *Dalzell & Gibson, Stocks*, 402!; Landi near Karachi, *Cooke*!; Hyderabad, *Woodrow*!, *Bhola Puran*!; Jemadar ka Landa near Karachi, *Stocks*, 82!; Mulir, *Woodrow*; Boogta hills, *Vicary*!—DISTRIB. Beluchistan to Egypt and Nubia.

4. **Convolvulus rhyniospermus,** *Hochst. ex Choisy, in DC. Prodr.* v. 9 (1845) p. 405. Stems many from a woody rootstock, 6–15 in. long, terete, slender, more or less pubescent. Leaves oblong-lanceolate, $\frac{1}{2}$–1 in. long, acute or subobtuse, mucronulate, sparsely hairy; petioles $\frac{1}{12}$ in. long, hairy. Flowers in axillary few-flowered densely villous

clusters, sessile on the top of a hairy peduncle $\frac{1}{30}$–$\frac{1}{8}$ in. long; bracts $\frac{1}{4}$–$\frac{1}{3}$ in. long, oblong-lanceolate, subacute, densely villous. Calyx very densely silky with long hairs which often exceed $\frac{1}{8}$ in. long; outer sepals $\frac{1}{3}$ in. long, ovate-lanceolate, acute; inner shorter and much narrower. Corolla $\frac{2}{3}$ in. long, tubular, divided about $\frac{1}{4}$ the way down into 5 ovate acute lobes which are penicillate at the apex. Ovary glabrous; stigmas $\frac{1}{12}$ in. long, filiform. Capsules globose, $\frac{1}{6}$ in. in diam., glabrous. Seeds minutely tuberculate. Fl. B. I. v. 4, p. 218; Wight, Icon. t. 1368; Aitch. Pb. & Sind Pl. p. 99 (by error *rhynchospermus*); Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172.—Flowers: Oct.

In the Bombay Presidency confined to Sind. SIND: *Stocks*, 474!, *Dalzell*, 56!, *Cooke*!, *Bhola Puran*!, *Woodrow*; Jemadar ka Landa near Karachi, *Stocks*, 474!; Karachi to Magar Pir, *Wykeham Perry*!—DISTRIB. Cordofan.

5. **Convolvulus glomeratus,** *Choisy, ex DC. Prodr.* v. 9 (1845) p. 401. Stems 1½–3 ft. long, many from a vertical root, prostrate, slender, more or less pubescent. Leaves 1–1½ by ⅜–½ in., oblong, acute, mucronulate, more or less sparsely pubescent, base rounded or subcordate; petioles ⅛ in. long, slender. Flowers in dense globose villous heads, on axillary solitary hairy slender peduncles ½–3 in. long; bracts foliaceous, ovate-lanceolate, ½–¾ in. long, hairy and with densely ciliate margins. Sepals nearly ½ in. long, ovate-lanceolate, acuminate, very densely clothed with long silky hairs, the 2 outer sepals broader than the 3 inner. Corolla tubular, ½ in. long, the upper part slightly pubescent outside; limb with 5 broadly deltoid shallow, acute lobes, with a small tuft of hairs at the apex of each. Stamens equal. Ovary glabrous; stigmas $\frac{1}{16}$–$\frac{1}{12}$ in. long, clavate or elliptic-oblong. Capsules ⅕ in. in diam., subglobose, glabrous. Seeds smooth, not tuberculate. Fl. B. I. v. 4, p. 219; Wight, Icon. t. 1366; Boiss. Fl. Orient. v. 4, p. 102; Aitch. Pb. & Sind Pl. p. 98; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172.—Flowers: Dec.

The stigmas are more like the stigmas of *Jacquemontia* than of *Convolvulus*.

In the Bombay Presidency confined to Gujarat (Kathiawar) and Sind. GUJARAT: Porbandar (Kathiawar), *Woodrow*. SIND: *Stocks*, 376!, *Dalzell*, 53!, *Woodrow*, *Bhola Puran*!; Jemadar ka Landa near Karachi, *Stocks*, 376!—DISTRIB. India (Panjáb); Afghanistan, Beluchistan, W. Tropical Africa.

VAR. *volubilis*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 219. Stems twining; leaves larger, sometimes 2½ by 1 in.; petiole ¼–⅓ in. long; heads of flowers larger.

GUJARAT: Veráwal (Kathiawar), *Cooke*! SIND: *Dalzell*! Seems hardly more than a luxuriant specimen of the type.

6. **Convolvulus arvensis,** *Linn. Sp. Pl.* (1753) p. 153. Rootstock creeping. Stem trailing or twining when near support, often twisted upon itself, more or less angular, glabrous or pubescent. Leaves 1–2½ in. long, variable in breadth, ovate or oblong, glabrous or nearly so, obtuse and apiculate at the apex, auriculate or hastate at the base, the lower leaves often lobed; petioles ¼–¾ in. long. Peduncles 1–2 in. long, axillary, solitary, slender, with a pair of small linear bracts at the apex from which the pedicels issue; pedicels ⅛–1 in. long, solitary or 2–3, in which case each pedicel except the primary one has

2 small bracts beyond the middle. Sepals ⅕-¼ in. long, broadly elliptic, obtuse or truncate, glabrous or nearly so, unequal. Corolla reaching ¾ in. long, broadly infundibuliform, pink or nearly white, glabrous. Stamens unequal. Ovary glabrous; stigmas $\frac{1}{10}$ in. long, filiform. Capsules ¼-⅓ in. in diam., globose, glabrous. Seeds subtrigonous, dark reddish-brown, glabrous or puberulous. Fl. B. I. v. 4, p. 219; Grah. Cat. p. 132; Dalz. & Gibs. p. 163; Syme, Eng. Bot. ed. 3, v. 6 (1866) p. 85, t. 923; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Watt, Dict. Econ. Prod. v. 2, p. 518.—Flowers: Dec.-Feb. VERN. *Chándvel*; *Hiranpag*.

DECCAN: Jeur, *Woodrow*; Poona, *Cooke*!; Kirkee, *G. M. Woodrow*!, *J. G. Woodrow*!; Máwal (Poona districts), *Kanitkar*!; black soil of the Deccan, *Gibson* ex *Graham*. KANARA: *Law*! GUJARAT: common, *Dalzell & Gibson*. SIND: Karachi, *Woodrow*!; Sibi, *Cooke*!—DISTRIB. A common plant widely distributed throughout the world; known in England as the *Small Bindweed*.

11. **JACQUEMONTIA,** Choisy.

Twining (rarely prostrate) herbs or undershrubs, usually pubescent with hairs that are often 3- or more-branched. Leaves often cordate, entire or rarely toothed or lobed. Flowers in axillary compound umbellate or capitate cymes, rarely solitary; bracts small. Sepals 5, equal or unequal. Corolla small, tubular or infundibuliform; limb plicate, the vertical bands ending in 2 distinct nerves. Stamens 5, included. Ovary glabrous, 2-celled; ovules 4; style filiform; stigmas 2, large, flattened, elliptic. Capsule globose, usually 8-valved, 2-celled. Seeds normally 4, usually glabrous, often slightly winged on the margins.—DISTRIB. Species about 40, chiefly tropical American.

1. **Jacquemontia paniculata,** *Hallier f. in Engl. Jahrb.* v. 16 (1893) p. 541 & v. 18 (1894) p. 95. Stems twining, terete, glabrous or pubescent; young parts pubescent. Leaves 1½-3 by 1-2 in., ovate, acuminate, very acute, nearly glabrous, base shallowly cordate; petioles ½-1¼ in. long, pubescent. Flowers white, in pedunculate many-flowered umbellate cymes; peduncules 1-1½ in. long, pubescent; pedicels ⅛-¼ in. long, pubescent; bracts beneath the pedicels ⅛ in. long, narrowly linear, pubescent. Sepals ⅓ in. long, ovate-lanceolate, acuminate, pubescent. Corolla tubular, ½ in. long, with 5 distinct glabrous bands which are 2-nerved at the apex; limb with 5 ovate-deltoid acute lobes ⅛ in. deep. Stamens equal. Ovary glabrous; stigmas 2, flattened, $\frac{1}{10}$ in. long, elliptic-oblong, revolute. Capsules ⅕ in. in diam., globose, glabrous, 8-valved. Seeds when fully ripe trigonous, rounded and slightly tuberculate on the back, slightly winged on the margin. *Ipomœa paniculata*, Burm. Fl. Ind. (1768) p. 50, t. 21, fig. 3. *Convolvulus parviflorus*, Vahl, Symb. v. 3 (1794) p. 29; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 220; Dalz. & Gibs. p. 163; Trim. Fl. Ceyl. v. 3, p. 226; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Watt, Dict. Econ. Prod. v. 2, p. 519.—Flowers: Oct.-Nov.

KONKAN: island of Karanja, *Dalzell & Gibson*; Marmagão, *Cooke*!, *Woodrow*! DECCAN: Dongergaon near Ahmednagar, *Woodrow*!; Mutha hills, *Bhiva*! S. M. COUNTRY: Castlerock, *Kanitkar*! GUJARAT: Surat, *Dalzell & Gibson*; Chandod, *Kanitkar*!—DISTRIB. India (Assam, W. Peninsula); Ceylon, Malaya, Australia, Tropical Africa.

Jacquemontia cærulea, Choisy, in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 476. A well-known slender twiner, a native of S. America, very common in gardens. It has slender stems, cordate leaves, and a small broadly infundibuliform corolla. Fl. B. I. v. 4, p. 220.

12. **MERREMIA,** Dennst.

Shrubs or herbs usually climbing; stems not or rarely winged. Leaves alternate, entire, lobed or divided. Flowers axillary, solitary or in few-flowered (rarely many-flowered) cymes; peduncles usually long. Sepals 5, subequal, elliptic or lanceolate usually acuminate (rarely rounded or truncate), convex, usually slightly enlarged and thickened in fruit. Corolla campanulate or infundibuliform, usually white, with 5 vertical bands which are usually marked by 5 dark violet lines; limb plicate, margin slightly lobed. Stamens 5, unequal, included or exserted; filaments filiform; anthers usually twisted; pollen usually with longitudinal folds never echinulate. Ovary 2–4-celled; ovules 4; style filiform; stigma 2-globose. Capsule 4-valved, 1–4-celled, the style sometimes separating with a small operculum. Seeds 4 (rarely fewer), dull, usually glabrous.—DISTRIB. Species about 40 in the warmer regions of the world.

Leaves entire or occasionally 3-lobed in *M. chryseides*.	
Inner sepals 2-lobed at the apex.	
Leaves reniform, ½–1 in. broad	1. *M. emarginata.*
Inner sepals not lobed at the apex.	
Flowers in compound umbellate cymes; seeds clothed with long spreading hairs	2. *M. umbellata.*
Flowers 1–3 on axillary peduncles; seeds glabrous.	
Peduncles less than 1 in. long; sepals elliptic, subobtuse, mucronate	3. *M. tridentata.*
Peduncles exceeding 1 in. long; sepals lanceolate, acuminate with recurved points	4. *M. hastata.*
Flowers in dense axillary racemose cymes; seeds with fulvous velvety pubescence; sepals oblong, truncate	5. *M. chryseides.*
Leaves palmately 5–7-lobed.	
Root tuberous	6. *M. rhyncorhiza.*
Root fibrous	7. *M. vitifolia.*
Leaves digitately 5-partite	8. *M. pentaphylla.*

1. **Merremia emarginata,** *Hallier f. in Engl. Bot. Jahrb.* v. 16 (1893) p. 552. Stems numerous, filiform, creeping and rooting at the nodes, not twining, clothed with scattered long soft hairs. Leaves ½–1 in. broad, usually broader than long, reniform or ovate-cordate, obtuse, crenate, glabrous; petioles ¼–1 in. long, hairy. Flowers yellow, axillary, solitary or few (usually 2–3) together on a very short (often almost obsolete) peduncle; bracts small, ovate, acute, hairy; pedicels short. Sepals slightly hairy on the back, strongly ciliate on the margins, the 2 outer ⅛ in. long, ovate, mucronate, the 3 inner longer reaching nearly ¼ in. long, subquadrate, deeply divided at the apex into 2 truncate divaricate lobes. Corolla ¼ in. long; lobes of the limb acute. Capsules ⅙–⅕ in. in diam., subglobose, smooth, surrounded by the slightly enlarged ciliate sepals. Seeds glabrous, dark chestnut-colored (*Clarke*).

The strongly ciliate 2-lobed inner sepals are a marked character. *Evolvulus emarginatus*, Burm. Fl. Ind. p. 77, t. 30, fig. 1. *Ipomœa reniformis*, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6 (1834)

p. 446; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 206; Grah. Cat. p. 131; Dalz. & Gibs. p. 164; Trim. Fl. Ceyl. v. 3, p. 218; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 491.—Flowers: Sept.–Oct. VERN. *Undirkáni.*

Common in places where water has lodged. KONKAN: *Law!*, *Stocks!*, *Dalzell & Gibson.* DECCAN: *Dalzell & Gibson*, *Woodrow*; Poona, *Woodrow*; Miraj, *Cooke!* S. M. COUNTRY: Belgaum, *Ritchie*, 1132!—DISTRIB. India (W. Peninsula); Ceylon, S.E. Africa, Tropical Africa.

2. **Merremia umbellata,** *Hallier f. in Engl. Bot. Jahrb.* v. 16 (1893) p. 552 & v. 18, p. 114. Perennial; stems very long, scandent (only slightly twining), somewhat angular, slightly pubescent. Leaves variable, 1½–2½ by ½–2 in., oblong or elliptic or hastate, obtuse or acute, apiculate, nearly glabrous above, base rounded or cordate; nerves prominent beneath with reticulate veins between; petioles ¼–¾ in. long, pubescent. Flowers white or cream-colored, in axillary compound umbellate cymes; peduncles ¼–1½ in. long; pedicels ⅛–1 in. long; bracts caducous. Sepals ¼–⅓ in. long, broadly elliptic, concave, glabrous or nearly so, obtuse, aristate. Corolla tubular-infundibuliform, 1–1½ in. long, with badly defined interspaces between the bands, the bands rather faintly lineate; limb slightly lobed; buds pubescent at the tip. Stamens included. Capsules ⅛ in. in diam., globose, glabrous. Seeds ¼ in. long, densely clothed with long soft spreading hairs. *Convolvulus umbellatus*, Wall. Cat. (1828) 2329. *Ipomœa cymosa*, Rœm. & Schultz, Syst. Veg. v. 4 (1819) p. 241; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 211; Trim. Fl. Ceyl. v. 3, p. 219; Talb. Trees, Bomb. ed. 2, p. 251; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 484.—Flowers: Jan.–Feb.

Hallier f. includes this species in the section *Xanthips* (Engl. Bot. Jahrb. v. 18, p. 133), in which the bands of the corolla are said to be never lineate. I have not found the bands destitute of lines in any of the specimens I have examined.

KONKAN: *Law!*; Ambeghát, *Kanitkar!* S. M. COUNTRY: hills S. of Belgaum, *Ritchie*, 1128! KANARA: *Bhiva!*; common in the forests of the Supa subdivision, *Talbot.*—DISTRIB. Throughout India (except the N.W. dry area); Ceylon, Java, Timor, China, S. America, W. Indies, Australia, Tropical Africa.

3. **Merremia tridentata,** *Hallier f. in Engl. Bot. Jahrb.* v. 16 (1893) p. 552. Perennial with a small woody rootstock; stems elongate, prostrate, not twining, slender, angular, glabrous. Leaves ½–1 by $\frac{1}{16}$–¼ in., linear-hastate or oblong-obovate, the linear leaves usually acute, the obovate ones obtuse, often deeply emarginate and 3-toothed at the apex, all glabrous and dilated at the base into toothed auricles; petioles very short, filiform, or the leaves sessile. Flowers axillary; peduncles ⅛–⅞ in. long, filiform, solitary, with minute alternate lanceolate bracts beneath the pedicels; pedicels 1–3, stout, somewhat clavate, ⅛ in. long. Sepals ⅙–⅕ in. long, elliptic, subobtuse, strongly mucronate (especially the inner ones), glabrous, the outer rather shorter than the inner. Corolla pale-yellow, less than ½ in. long; bands not very strongly lineate. Capsules ⅙ in. in diam., globose. Seeds trigonous, with a longitudinal ridge on the rounded back, glabrous. *Ipomœa tridentata*, Roth, in Rœm. Archiv. Bot. v. 1 (1798) part 3, p. 38; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 205; Grah. Cat. p. 131; Dalz. & Gibs.

p. 165; Trim. Fl. Ceyl. v. 3, p. 218; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Aug.–Oct. VERN. *Morga.*

KONKAN: Shrivardhan, *Woodrow!*; near Bassein and Ghorabandar, *Dalzell & Gibson*; S. Konkan, *Kanitkar!* S. M. COUNTRY: Badami, *Woodrow!*, *Cooke!* GUJARAT: Neriad, *Woodrow!*—DISTRIB. India (W. Peninsula, extending north to Chota Nagpore); Ceylon, Angola, Mauritius, Madagascar.

4. **Merremia hastata,** *Hallier f. in Engl. Bot. Jahrb.* v. 16 (1893) p. 552. A biennial diffuse twining herb; stems very long, slender, angular, glabrous. Leaves subsessile, 1½–3 by ⅛–½ in., hastate-oblong, acute, cuspidate, glabrous, dilated and with coarsely dentate auricles at the base. Flowers in axillary 1–3-flowered cymes; peduncles sometimes exceeding 3 in. long, slender; bracts beneath the pedicels minute, lanceolate; pedicels ¼–1¼ in. long, slightly clavate. Sepals ⅜ in. long, lanceolate, long-acuminate, very acute, with recurved points. Corolla ¾ in. long, pale-creamy-yellow or white, red at the base of the tube inside; limb shallowly lobed. Capsules ¼ in. in diam., depressed-globose, surrounded by the slightly enlarged sepals. Seeds glabrous. Prain, Beng. Pl. p. 730. *Convolvulus hastatus*, Desr. in Lamk. Encyc. Méthod. v. 3 (1789) p. 542 (*not* of Sieb. nor Thunb.). *C. denticulatus*, Spreng. Syst. v. 1, p. 603. *Ipomœa denticulata*, R. Br. Prodr. (1810) p. 485. *I. filicaulis*, Blume, Bijdr. p. 721 (*not* of Meyer); Grah. Cat. p. 131; Dalz. & Gibs. p. 165; Bot. Mag. v. 90, t. 5426. *I. angustifolia*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 205 (*not* of Jacq.); Trim. Fl. Ceyl. v. 3, p. 217; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 476.—Flowers: Aug.–Dec.

Dalzell in Herb. Kew. without locality. KONKAN: *Stocks!*, *Law!*, *Graham*, *Dalzell & Gibson.* DECCAN: *Graham*, *Dalzell & Gibson.* S. M. COUNTRY: Londa, *Woodrow!* KANARA: *Ritchie*, 1893!; Karwar, *Woodrow.*—DISTRIB. India (Bengal, Khasia mountains, W. Peninsula); Ceylon, S.E. Asia, Malaya, Australia, Tropical Africa.

5. **Merremia chryseides,** *Hallier f. in Engl. Bot. Jahrb.* v. 16 (1893) p. 552. Stems twining, branched, glabrous but often rough with small prominences. Leaves 1–3 by ½–2½ in., ovate, acute, apiculate, sometimes 3-lobed, entire or coarsely toothed, glabrous, base deeply cordate with rounded lobes; petioles 1–2 in. long, slender. Flowers small, numerous, in rather dense axillary racemose cymes; peduncles ½–3 in. long; bracts small, caducous; pedicels short. Sepals ⅕–¼ in. long, oblong, truncate, apiculate or sometimes obscurely toothed, glabrous, becoming stiff and chartaceous and reflexed in fruit. Corolla yellow, ⅓ in. long, campanulate-infundibuliform; limb with 5 distinct triangular lobes; bands strongly lineate. Stamens slightly exserted. Capsules ¼ in. long, broadly ovoid, somewhat 4-angled, glabrous, transversely wrinkled. Seeds with velvety fulvous pubescence, trigonous, rounded on the back. *Ipomœa chryseides*, Ker-Gawl. in Bot. Reg. (1818) t. 270; Dalz. & Gibs. p. 166; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 206; Trim. Fl. Ceyl. v. 3, p. 219; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Oct.–Nov.

Not very common. KONKAN: Muneri in the Wari Country, *Dalzell & Gibson.* DECCAN: Gokak, *Cooke!* S. M. COUNTRY: Belgaum, *Ritchie*, 1131! GUJARAT: Nausari, *Cooke!*; Dakor. *Kanitkar!*—DISTRIB. Throughout India; Ceylon, Malaya, China, Australia, Tropical Africa.

6. **Merremia rhyncorhiza,** *Hallier f. in Engl. Bot. Jahrb.* v. 16 (1893) p. 552. Root an ovoid compressed beaked tuber; stems filiform, twining, glabrous. Leaves 1½–2 in. in diam., palmately cut almost to the base into 5–7 segments, the middle the longest, sparsely hairy above and on the nerves beneath with fulvous hairs; segments oblong, acute, unequally lobed or pinnatifid; petioles filiform, 1–1½ in. long. Peduncles 1-2-flowered, filiform, glabrous, 2–4 in. long; bracts ⅛–⅙ in. long, lanceolate, acute; pedicels ⅛–⅜ in. long. Sepals unequal, glabrous, oblong-lanceolate, acute, the 2 outer ⅜ in. long, shorter than the inner, the 3 inner ½ in. long. Corolla yellow, 1–1¼ in. long by 2 in. in diam. at the mouth. Anthers ⅛ in. long, twisted, narrowly sagittate. Fruit not seen. *Ipomœa rhyncorhiza*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 179. Fl. B. I. v. 4, p. 214; Dalz. & Gibs. p. 167; Talb. Trees, Bomb. ed. 2, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172. —Flowers: July–Sept.

A rare plant. KONKAN: Sahyadri mountains, *Dalzell*! KANARA: near the coast at Belikeri, *Talbot*; Hatigheri (N. Kanara), *Woodrow*.—DISTRIB. India (W. Peninsula).

The tubers are eaten and greedily sought for by the natives, which accounts for the rarity of the plant. The leaves are also used as a vegetable.

7. **Merremia vitifolia,** *Hallier f. in Engl. Bot. Jahrb.* v. 16 (1893) p. 552. A perennial twiner; stems long, stout, much-branched, the young ones clothed with spreading deciduous hairs. Leaves 2–6 in. in diam., the young ones bronze-colored, all palmately cut about ⅓ the way down or a little more, into 5 or sometimes 7 triangular acuminate lobes, more or less hairy above and on the nerves beneath, margins coarsely serrate-dentate, base cordate; petioles ½–2 in. long, patently hairy. Flowers 1–7 in pedunculate cymes; peduncles ¼–½ in. long, patently hairy; buds pointed; bracts linear, caducous. Calyx more or less densely clothed outside with long spreading hairs; sepals rather more than ½ in. long, enlarged in fruit, broadly elliptic, obtuse, the outer slightly shorter, apiculate. Corolla yellow, 1–2 in. long, subcampanulate; bands distinct, strongly lineate. Capsules ½ in. in diam., subglobose. Seeds glabrous. *Ipomœa vitifolia*, Sweet, Hort. Brit. ed. 2 (1830) p. 372; Grah. Cat. p. 132; Dalz. & Gibs. p. 165; Fl. B. I. v. 4, p. 213; Trim. Fl. Ceyl. v. 3, p. 224; Talb. Trees, Bomb. ed. 2, p. 251; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 172; Watt, Dict. Econ. Prod. v. 4, p. 496.—Flowers: Oct.–Dec. VERN. *Navli.*

KONKAN: *Stocks*!, *Law*!; Vingorla, *Kanitkar*!; hills about Bassein, *Graham*; Malabar Hill (Bombay), *Graham*; hilly parts of the Konkan generally, *Dalzell & Gibson*. S. M. COUNTRY: Castlerock, *Cooke*! KANARA: Kála naddi, *Ritchie*, 1133! —DISTRIB. Throughout India (except the N.W. dry area); Ceylon, Malay Islands.

8. **Merremia pentaphylla,** *Hallier f. in Engl. Bot. Jahrb.* v. 16 (1893) p. 552. A twining annual; stems clothed with long scattered hairs from glandular bases. Leaves digitate; leaflets 5, broadly lanceolate, acuminate, subsessile, 2–4 by ¾–1¾ in., thinly hirsute with long hairs (in cultivation often glabrous), base acute; petioles 1–4 in. long, hairy. Flowers white, in few-flowered lax fulvous-hairy racemose cymes; peduncles 1–4 in. long; bracts ¼–⅓ in. long, linear; pedicels ½–2 in. long. Sepals enlarged in fruit, thin, the 3 outer densely fulvous-hairy, the 2 outermost of these ⅔ by ¼ in., elliptic-oblong, subacute, the third

smaller, ½ in. long, ovate, acute, the 2 inner sepals still smaller, glabrous or with a few scattered hairs on the back, membranous. Corolla 1 in. long, infundibuliform. Capsules ⅓–½ in. long, ovoid, papery, quite glabrous. Seeds glabrous, shining. *Ipomœa pentaphylla*, Jacq. Coll. v. 2 (1788) p. 297; Icon. Rar. t. 319; Fl. B. I. v. 4, p. 202; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 171. *Ipomœa ægyptia*, Linn. Sp. Pl. (1753) p. 162. *Batatas pentaphylla*, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 436; Grah. Cat. p. 129; Dalz. & Gibs. p. 167; Aitch. Pb. & Sind Pl. p. 100.—Flowers: Sept.-Oct.

The plant varies much in hairiness; in cultivation the leaves and calyces often become nearly glabrous. To be consistent, Hallier should have adopted the oldest specific name, *ægyptia* which is due to Linnæus and dates from 1753.

Dalzell in Herb. Kew. without locality! KONKAN: Malabar Hill (Bombay), *Graham*. GUJARAT: Pál jungles, *Woodrow*; Deesa, *Stocks*!; Baroda, *Woodrow*; Domas near Surat, *Cooke*!—DISTRIB. India (W. Peninsula); Africa, Tropical America, Polynesia; often cultivated.

Merremia dissecta, Hallier f. in Engl. Bot. Jahrb. v. 16 (1893) p. 552. A native of Tropical America and the W. Indian islands introduced into the Bombay Presidency by Nimmo (*fide* Graham) and now becoming naturalized. It has twining usually hirsute stems, palmately 7-partite usually glabrous leaves with lanceolate acute lobes which are again lobulate, subpinnatifid or toothed. The corolla is campanulate, white or pinkish-white, with a purple throat and strongly lineate bands. *Ipomœa dissecta*, Pers. in L. Syst. ed. 15 (1797) p. 207 *in note* (*not* of Willd.). *Ipomœa sinuata*, Ortega, Decad. vii. p. 84; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 214; Choisy, in DC. Prodr. v. 9, p. 362; Grah. Cat. p. 132; Dalz. & Gibs. Suppl. p. 59; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172.—Flowers: Nov.

13. **OPERCULINA,** Silva Manso.

Large climbing herbs; stems winged. Leaves entire or lobed. Flowers large, axillary, solitary or in few-flowered cymes. Sepals 5, large, glabrous, increasing and thickening in fruit, at length splitting irregularly from the tip. Corolla infundibuliform, rarely campanulate; tube with 5 vertical smooth bands. Stamens 5; filaments filiform; anthers large, at length contorted; pollen not echinulate. Ovary 2-celled, glabrous; ovules 4; style filiform; stigma 2-globose. Capsule valveless, the epicarp circumscissile above the middle, the cap carrying away the style; endocarp at length irregularly rupturing. Seeds often solitary, black, glabrous.—DISTRIB. Most tropical regions; species about 10.

1. **Operculina Turpethum,** *Silva Manso, Enum. Subst. Braz.* (1836) pp. 16 & 49 (*turpetum*). Perennial with milky juice; root long, slender, fleshy, much-branched; stems very long, twining and much twisted together, angled and winged, pubescent, tough and brown when old. Leaves 2–4 by ½–2¾ in., ovate or oblong, rarely slightly lobulate, subacute, mucronate, more or less pubescent on both sides especially

when young, minutely reticulately veined, base cordate or truncate; petioles ¾–2 in. long, pubescent. Cymes few-flowered; peduncles stout, 1–2 in. long; bracts large, lanceolate, pubescent, reaching 1 in. long, caducous, often pinkish; pedicels ¼–1 in. long, stout, pubescent, slightly thickened upwards. Outer sepals up to ⅞ in. long in flower, much enlarged in fruit, broadly ovate or suborbicular, obtuse, mucronate, concave, pubescent; the 3 inner sepals smaller, scarcely ¾ in. long, very thinly membranous, glabrous, apiculate. Corolla white, 1½–2 in. long, subcampanulate. Anthers nearly ⅓ in. long, narrowly oblong, cordate. Capsules ½–⅔ in. in diam., globose, enclosed in the enlarged brittle very imbricate sepals, glabrous or faintly pubescent. *Ipomœa Turpethum*, R. Br. Prodr. (1810) p. 485; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 212; Grah. Cat. p. 131; Dalz. & Gibs. p. 165; Trim. Fl. Ceyl. v. 3, p. 222; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 493.—Flowers: Oct.-Jan. VERN. *Nisottar*; *Dudh-kalmi*.

KONKAN: Mumbra near Thana, *Cooke*!; Revadanda, *Woodrow, Kanitkar*!; Salsette, *Graham*. DECCAN: *Dalzell & Gibson*. GUJARAT: *Dalzell & Gibson, Woodrow*, 10!; very common in the southern parts especially about Dharanpur, *Graham*.—DISTRIB. Throughout India, sometimes cultivated; Ceylon, Malay Islands, Tropical America, Mauritius, Philippines, Tropical Africa.

The root of the plant has long been used in medicine as a purgative and is known as *Turpeth-root* or *Indian Jalap*. See Watt, Dict. Econ. Prod. l. c.

14. **IPOMŒA,** Linn.

Herbs (rarely shrubs) twining or prostrate, rarely erect or suberect. Leaves alternate, usually entire. Flowers usually large, in axillary (rarely paniculate) cymes which are often reduced to a single flower. Sepals 5, equal or unequal, imbricate, often enlarged in fruit. Corolla campanulate or infundibuliform; limb plicate, slightly lobed; bands usually defined by 2 prominent lines. Stamens 5, usually included; filaments filiform or dilated below, often unequal; anthers straight or contorted; pollen echinulate. Ovary 2 (rarely 3 or 4)-celled; ovules 4 (rarely 6); style filiform; stigma capitate, entire or 2–3-globose (rarely stigmas 2-linear). Capsule 4–6-valved, rarely indehiscent. Seeds usually 4 or 6 (rarely solitary), glabrous, bearded, or uniformly velvety or woolly.—DISTRIB. Tropical and warmer regions of the globe; species about 400.

Leaves entire (occasionally 3-lobed in *I. pilosa*).
- Outer sepals sagittate or cordate at the base ..... 1. *I. calycina*.
- Outer sepals not cordate at the base.
  - Sepals much enlarged in fruit..... 2. *I. barlerioides*.
  - Sepals not or slightly enlarged in fruit.
    - Flowers in sessile or nearly sessile heads.
      - Leaves ovate, acute; capsule hairy; seeds glabrous, minutely foveolate..... 3. *I. eriocarpa*.
      - Leaves elliptic or rhomboid, subacute; capsule glabrous; seeds furred, their margins villous ... 4. *I. Stocksii*.
      - Leaves oblong-hastate, acute; capsule glabrous; seeds velvety..... 5. *I. sindica*.
    - Flowers in pedunculate cymes or panicles.
      - Sepals hispid.
        - Stems prostrate; leaves as broad as long, very obtuse..... 6. *I. rumicifolia*.

Stems twining.
Leaves as broad as long, white-woolly beneath.
Outer bracts several; corolla less than 1 in. long ..... 7. *I. pilosa.*
Leaves longer than broad, not white-woolly beneath.
Heads enclosed in a large solitary boat-shaped outer bract ..... 8. *I. involucrata.*
Bracts minute, not enclosing the flowers; corolla 1½ in. long ..... 9. *I. Clarkei.*
Sepals glabrous (sometimes finely pubescent in *I. campanulata*).
Seeds shaggy on the angles.
Stems often muricate; corolla hypocrateriform, reaching 4½ in. long ..... 10. *I. longiflora.*
Seeds not shaggy on the angles.
An aquatic plant.
Stems hollow, trailing in mud or floating. 11. *I. aquatica.*
Terrestrial plants.
Sepals obtuse.
Flowers in subumbellate cymes; outer sepals shorter than the inner; corolla less than 2 in. long ..... 12. *I. sepiaria.*
Flowers in lax panicles; sepals equal; corolla ¾–1 in. long ..... 13. *I. staphylina.*
Flowers in corymbosely-branched cymes; sepals subequal; corolla 3 in. long... 14. *I. campanulata.*
Sepals acute.
Flowers 1–3 together; corolla ⅛ in. long ..... 15. *I. obscura.*
Leaves lobed (occasionally entire in *I. pes-tigridis*).
Prostrate (rarely twining) herbs.
Leaves deeply 2-lobed or sometimes only emarginate; corolla rose-purple, exceeding 1 in. long ..... 16. *I. biloba.*
Leaves digitately or the upper sometimes pedately 3–7-partite; corolla white, less than 1 in. long ..... 17. *I. dissecta.*
Twining herbs (sometimes creeping in *I. laciniata*).
Leaves palmately or digitately 3–9-lobed.
Sepals glabrous.
Flowers in paniculate cymes.
Corolla purple, exceeding 1 in. long ..... 18. *I. digitata.*
Peduncles 1–3-flowered.
Sepals ribbed and wrinkled on the back; corolla white, exceeding 2 in. long ..... 19. *I. laciniata.*
Sepals not ribbed on the back, dotted with white specks inside; corolla 1¼–2 in. long, violet with a purple tube ..... 20. *I. palmata.*
Sepals hairy.
Flowers in many-flowered, pedunculate heads; corolla 1 in. long, pale-pink ..... 21. *I. pes-tigridis.*

1. **Ipomœa calycina,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 201. Stem twining, sparingly clothed with long spreading hairs. Leaves 2–3 by 1¼–2 in., ovate, acutely acuminate, entire, sparsely hairy or nearly glabrous, cordate at the base with a wide sinus; petioles ½–1½ in. long, slender, clothed with long spreading hairs. Flowers 1–3; peduncles hairy; pedicels hairy, about as long as the peduncles; bracts ¼ in. long, ovate, acute. Sepals in flower ⅓ in. long, unequal, ciliate, the outer in fruit ½ by ¼ in., lanceolate-sagittate with obtuse auricles, the inner linear-lanceolate. Corolla white, tubular, scarcely 1 in. long. Capsules ½ in. long, ovoid, pointed, glabrous. Seeds ⅕ in. long, villous

all over, fringed on the margin with soft white hairs which are nearly ¼ in. long. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171. *Aniseia calycina*, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 482; Wight, Icon. t. 833; Grah. Cat. p. 250; Dalz. & Gibs. p. 163.—Flowers: Oct.

KONKAN: *Stocks!*, *Law!* DECCAN: road from Poona to Sattara near 25th milestone, *Woodrow*. GUJARAT: Surat, *Graham*, *Dalzell!*, *Woodrow*; Broach, *Dalzell!*

2. **Ipomœa barlerioides,** *Benth. & Hook. f. Gen. Pl.* v. 2 (1876) p. 872. Twining, hirsute, perennial; stems numerous. Leaves 1–2 by ½–1 in., ovate-oblong, subacute, often mucronulate, hairy on both sides, base usually cordate; petioles ⅛–¾ in. long, densely hairy. Flowers axillary, solitary; peduncles variable in length, sometimes reaching 3 in. or more, densely hairy, with 2 lanceolate bracts ¼–½ in. long at the top from which the short pedicel issues. Sepals much widened in fruit, densely villous, the exterior larger and broader, lanceolate, acute, ⅜–¾ in. long, the 2 interior sepals linear, acute. Corolla 2–3 in. long, purple, infundibuliform, attenuated into a long tube which is very narrow at its base, pubescent outside; limb subentire, plicate. Capsules ½ in. long, ovoid, glabrous. Seeds ⅓ in. long, oblong, villous or pubescent, the margins with short hairs. Fl. B. I. v. 4, p. 201; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Sept.–Oct.

Not common. KONKAN: *Dalzell!* S. M. COUNTRY: Párva Ghát, *Ritchie*, 1897! KANARA: *Law!*; Sirsi, *Woodrow*.—DISTRIB. India (N.W. Provinces, Oude, W. Peninsula).

3. **Ipomœa eriocarpa,** *R. Br. Prodr.* (1810) p. 484. Stems twining, slender, terete, clothed with appressed or spreading hairs. Leaves 1¾–3 by ¾–1½ in., ovate or ovate-oblong, acute, often apiculate, more or less hairy on both surfaces and with hairy margins, base cordate with rounded lobes; petioles 1 in. long, densely hairy with deflexed hairs. Flowers 1–3 (rarely more in a head); peduncles very short, under ¼ in. long; bracts ⅛–¼ in. long, linear, hairy; pedicels very short or 0. Sepals not or scarcely enlarged in fruit, very hairy, rather less than ½ in. long, with a long linear acumen from an ovate base, the outer sepals broader than the inner. Corolla ½ in. long, campanulate, pink, pubescent in the upper part and with small tufts of hairs at the apices of the small acute lobes. Ovary densely hairy. Capsules ¼–⅓ in. in diameter, globose, hairy. Seeds glabrous, minutely foveolate. Fl. B. I. v. 4, p. 204; Trim. Fl. Ceyl. v. 3, p. 217; Jackson, in Index Kewen. v. 1, p. 1224; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prodr. v. 4, p. 485. *Ipomœa sessiliflora* Roth, Nov. Pl. Sp. (1821) p. 116; Dalz. & Gibs. p. 166; Wight, Icon. t. 169. *I. hispida*, Rœm. & Schult. v. 4 (1819) p. 238. *Convolvulus hispidus*, Vahl, Symb. v. 3 (1794) p. 29.—Flowers: Sept.–Oct.

KONKAN: *Law!*, *Stocks!*; Malwán, *Nairne*; Bandra, *Nairne*. DECCAN: widely, *Woodrow*; Poona, *Cooke!*; Dongergaon near Ahmednagar, *Cooke!* S. M. COUNTRY: Dharwar, *Law!* KANARA: *Law!*; Kála naddi, *Ritchie*, 479! GUJARAT: Ankleshvar, *Kanitkar!*—DISTRIB. Throughout India; Ceylon, Afghanistan, Tropics of the Old World.

4. **Ipomœa Stocksii,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 204. Stems prostrate, twining, patently hairy. Leaves 2 in. long, elliptic or rhomboid, subacute, base obtuse or subcordate; petioles $\frac{1}{4}$–$1\frac{1}{4}$ in. long. Flowers in sessile heads; bracts $\frac{1}{4}$ in. long, lanceolate, hispid. Sepals $\frac{1}{3}$–$\frac{1}{2}$ in. long, elliptic-lanceolate, patently hispidulous. Capsules $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovoid, glabrous, 2-celled, 4-seeded. Seeds furred, margins villous. The above description is that of Mr. C. B. Clarke (*l. c.*).

This species differs from *I. eriocarpa*, R. Br., in the leaves, the seeds, and the capsules, which latter are hairy in *I. eriocarpa* and glabrous in *I. Stocksii*, while it differs from *I. sindica*, Stapf, in the leaves and seeds.

I have seen no specimens authenticated as having been collected in the Bombay Presidency. There is in all 1 sheet in Herb. Kew. carrying a *printed* Herbarium label of Herb. Hook. f. & Thoms. on which appears "*Malabar, Konkan* &c. Coll. *Stocks Law* &c." On the corner of the sheet is a small ticket on which is written "*Herb. Stocks,*" above which is a word apparently "*Sind.*"

5. **Ipomœa sindica,** *Stapf, in Kew Bull.* (1894) p. 346. Annual; stems reaching 2 ft. long, many from the root, slender, prostrate, hispid. Leaves $\frac{3}{4}$–$2\frac{1}{2}$ by $\frac{1}{4}$–$1\frac{1}{4}$ in., oblong-hastate or deltoid-hastate, much longer than broad, acute or acuminate, more or less hairy on both surfaces and with ciliate margins, base cordate with diverging lobes; petioles $\frac{1}{4}$–$1\frac{1}{2}$ in. long, hairy. Flowers in axillary few-flowered cymes often reduced to single flowers; peduncles scarcely any; bracts linear, $\frac{1}{10}$–$\frac{1}{8}$ in. long, hairy; pedicels very short. Sepals during flowering $\frac{1}{6}$–$\frac{1}{4}$ in. long, hispid, lanceolate, dilated at the base, slightly enlarged in fruit. Corolla infundibuliform, $\frac{1}{3}$ in. long, slightly 5-lobed with a small tuft of hairs at the tip of each lobe. Capsules $\frac{1}{5}$–$\frac{1}{4}$ in. long, globose or ovoid, glabrous. Seeds black, thinly grey-velvety. Very close to *Ipomœa eriocarpa*, Br., from which it may be distinguished by its glabrous capsules and velvety seeds. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Oct.

SIND: near Karachi, *Woodrow*!, *Cooke*!; Jemadar ka Landa near Karachi, *Stocks*, 41!—DISTRIB. North Western India.

6. **Ipomœa rumicifolia,** *Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv.* v. 6 (1834) p. 447. Annual; stems usually prostrate, sparsely hirsute. Leaves 1–$1\frac{1}{2}$ in. long, nearly as broad as long, ovate, hastate or subreniform, very obtuse, usually apiculate, sometimes emarginate, entire, or sometimes irregularly angular or lobulate, glabrous, base cordate, usually with a wide sinus and rounded lobes; petioles reaching 2 in. long. Peduncles short, 0–$\frac{1}{2}$ in. long, laxly few-flowered; bracts $\frac{1}{5}$ in. long, linear, hairy, subpersistent; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, slightly thickened in fruit. Sepals $\frac{1}{4}$ in. long, ovate, acute, clothed with spreading hairs from bulbous bases, ciliate. Corolla tubular-campanulate, $\frac{1}{3}$–$\frac{1}{2}$ in. long, glabrous. Capsules $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovoid, apiculate, glabrous, veined. Seeds usually 4, densely velvety. Fl. B. I. v. 4, p. 207; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Dec.

Rare. SIND: Karachi, *Woodrow*!—DISTRIB. India (W. Peninsula); Tropical Africa.

7. **Ipomœa pilosa,** *Sweet, Hort. Brit.* ed. 2 (1830) p. 372. Annual, twining; stems clothed with long hairs from glandular bases. Leaves

2-5 in. long and about as broad as long, broadly ovate, acute or acuminate, entire or sometimes more or less deeply 3-lobed, hairy above, white-woolly beneath, base cordate; petioles 2-4 in. long, hairy. Flowers in lax racemose bracteate cymes; peduncles 1-3 in. long; bracts ¼-⅜ in. long, lanceolate, acute, hairy, persistent; pedicels ¼-¾ in. long. Sepals ½ in. long and upwards, oblong-lanceolate, acuminate, densely hairy and with strongly ciliate margins. Corolla tubular-infundibuliform, ¾-⅞ in. long; limb with scattered hairs outside, acutely lobed. Capsules ¼-⅓ in. in diam., subglobose, slightly pubescent towards the top. Seeds clothed with velvety pubescence and long cottony hairs as well. Fl. B. I. v. 4, p. 213; Dalz. & Gibs. p. 166; Wight, Icon. t. 837; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172.—Flowers: Dec.

GUJARAT: Baroda, *Woodrow*!; Godra, *Cooke*!; Ahmedabad, *Woodrow*. SIND: Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (W. Himalaya, Panjáb, Bengal); Tropical Africa.

8. **Ipomœa involucrata,** *Beauv. Fl. d'Owar. & Bén.* v. 2 (1810) p. 52, t. 89. Annual, twining; stems appressedly or patently hairy. Leaves 2-3 by 1½-2½ in., rather longer than broad, broadly ovate, acuminate, obtuse, apiculate, entire, hairy on both surfaces, green beneath, base deeply cordate with rounded lobes; petioles 1-3 in. long, hairy. Flowers sessile, in few-flowered heads enclosed in a large boat-shaped bract which reaches ¾ in. long and occasionally as much as 2½ in. broad, hairy inside and outside, strongly veined; peduncles 1-4 in. long with deflexed hairs; inner bracts as long as the sepals, obovate, hairy. Calyx densely hirsute outside, especially in the lower part; 3 outer sepals ½ in. long or a little longer, oblong, obtuse, very hairy in the lower part, strongly ciliate, veined; the 2 inner sepals smaller, narrowly linear, densely hairy along the back and with membranous margins. Corolla bright-pink, 1¼ in. long; tube ¾ in. long, narrow, cylindric; limb exceeding 1 in. in diam., suddenly widened at the mouth. Capsules ¼ in. in diam., subglobose or obovoid, somewhat depressed, papery, glabrous. Seeds glabrous, with a very narrow fringe of short hairs on the margins. Hallier f. Monogr. Convolv. in Herb. Boiss. v. 5, p. 375; Prain, Beng. Pl. p. 734. *Ipomœa pileata,* Roxb. Fl. Ind. ed. Carey, v. 2 (1824) p. 94; Wight, Icon. t. 1363; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 203; Trim. Fl. Ceyl. v. 3, p. 215; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Oct.-Nov.

KONKAN: *Stocks*!, *Law*!; jungles in S. Konkan, rare. *Dalzell & Gibson*; Savantvádi hills, *Kanitkar*!, *Woodrow*.—DISTRIB. India (Assam, Bengal, W. Peninsula); Ceylon, Tropical Africa.

9. **Ipomœa Clarkei,** *Hook. f. Fl. B. I.* v. 4 (1883) p. 734 (under additions and corrections). Annual; stems twining, slender, glabrous. Leaves 2-3½ by 1½-2½ in., broadly ovate, finely acuminate, more or less hairy on both surfaces, base deeply cordate with rounded lobes; petioles 1-2½ in. long. Peduncles 1-3-flowered, ¾-1½ in. long, slender; bracts minute, lanceolate, acute; pedicels ¼-1¼ in. long. Sepals ⅓ in. long, linear-lanceolate, acute, sparsely hairy and ciliate. Corolla 1½ in. long, infundibuliform. Capsules ⅓ in. long, ovoid, glabrous. Seeds puberulous, dark-brown. *Ipomœa Stocksii* in error for *Ipomœa Clarkei*, in Hook. f.

Fl. B. I. v. 4, p. 207 (correction made in p. 734); Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Sept.

Rare. KONKAN: *Law!*, *Stocks!* DECCAN: Tulja hill near Junnar (Poona districts), *Kanitkar!*—DISTRIB. India (W. Peninsula).

10. **Ipomœa longiflora,** *R. Br. Prodr.* (1810) p. 484. An extensive climber; stems long, cylindric, glabrous, often subspinous with short retroflexed tubercles. Leaves 3–6 by $2\frac{3}{4}$–$5\frac{1}{2}$ in., broadly ovate, shortly acuminate, entire, glabrous, base deeply cordate; main nerves conspicuous beneath; petioles 2–5 in. long. Peduncles usually solitary, variable in length, 1–3-flowered; bracts small, caducous; pedicels $\frac{1}{2}$–$\frac{3}{4}$ in. long, thickened in fruit. Sepals $\frac{3}{4}$–$\frac{7}{8}$ in. long, broadly elliptic obtuse, mucronate, glabrous, the 2 outer rather smaller than the inner, all enlarged and becoming orbicular in fruit. Corolla white, reaching as much as $4\frac{1}{2}$ in. long; tube reaching 3 in. long. Filaments exceeding 1 in. long, equal, hairy at the base. Capsules about 1 in. in diam., surrounded by the greatly enlarged sepals, glabrous. Seeds brown-velvety with a denser fringe on the margins. Prain, Beng. Pl. (1903) p. 733. *Ipomœa grandiflora*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 198 in part (*not* of Lamk. nor Roxb.); Talb. Trees, Bomb. ed. 2, p. 250; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Sept.–Nov.

Rare; near the sea-coast, but often cultivated. KONKAN: *Law!*, *Stocks!* KANARA: in moist forests and along the banks of nálas, very rare, *Talbot*; below the fall on the Kála naddi, *Ritchie!*—DISTRIB. India (W. Peninsula); most Tropical shores of the Old World, Australia.

11. **Ipomœa aquatica,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 44. Annual or biennial; stems long, prostrate, trailing on mud or floating, thick, hollow, rooting at the nodes, glabrous. Leaves 2–5 by $1\frac{1}{4}$–3 in. (occasionally narrower), elliptic-oblong or subdeltoid, acute, glabrous, base usually dilated, cordate or hastate with rounded or acute lobes, less commonly truncate; petioles $1\frac{1}{2}$–5 in. long. Peduncles $\frac{1}{2}$–4 in. long, usually 1–5-flowered; bracts small, linear-lanceolate; pedicels 1–2 in. long. Sepals $\frac{1}{4}$–$\frac{1}{3}$ in. long, subequal, oblong-lanceolate, subacute, membranous, glabrous. Corolla $1\frac{3}{4}$–2 in. long, infundibuliform, the limb very pale-purple (nearly white), the throat and tube dull-purple; lobes obscure. Filaments very unequal, hairy at the base. Ovary glabrous. Capsules $\frac{1}{3}$ in. long, ovoid. Seeds 4 or 2, minutely pubescent. Fl. B. I. v. 4, p. 210; Jackson, in Index Kewen. v. 1 (1893) p. 1223; Trim. Fl. Ceyl. v. 3, p. 221; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 476. *Ipomœa reptans*, Poir. Ency. Suppl. v. 3 (1813) p. 460 in Obs.; Grah. Cat. p. 130; Dalz. & Gibs. p. 164. *Convolvulus reptans*, Linn. Sp. Pl. (1753) p. 158.—Flowers: Nov.–Apr. VERN. *Nalichi-bhági.*

Margins of tanks and other moist places throughout the Presidency, very common in Gujarat.—DISTRIB. Throughout India, common; Ceylon, Tropical Asia, Africa, and Australia.

The young shoots, leaves, and roots are eaten as a vegetable. The plant is largely cultivated in the Madras Presidency. See Watt, *Dict. Econ. Prod. l. c.*

12. **Ipomœa sepiaria,** *Kœnig, in Roxb. Hort. Beng.* (1814) p. 14. Perennial; stems twining, slender, glabrous or more or less hairy. Leaves 1–3 by $\frac{7}{8}$–$2\frac{1}{4}$ in., ovate, acute, entire, usually glabrous, cordate

at the base with a wide sinus and rounded lobes; pétioles 1–1¾ in. long, slender, glabrous. Flowers in pedunculate subumbellate cymes; peduncles 1–6 in. long, glabrous; bracts small, lanceolate, caducous; pedicels ½–½ in. long, clavate in fruit. Sepals broadly elliptic, slightly apiculate, glabrous and with membranous margins, the 2 outer shorter than the inner, rugose on the back, scarcely ¼ in. long, the 3 inner a little more than ¼ in. long. Corolla tubular-infundibuliform, pale-purple or whitish, 1½ in. or more long, the mouth suddenly widened; tube nearly 1 in. long, purple within; lobes of the limb acute, shortly apiculate. Filaments hairy at the very base. Capsules ⅓ in. long, ovoid, glabrous, 4- or 2-seeded. Seeds grey with silky pubescence. Fl. B. I. v. 4, p. 209; Grah. Cat. p. 131; Dalz. & Gibs. p. 166; Wight, Icon. t. 838; Trim. Fl. Ceyl. v. 3, p. 220; Talb. Trees, Bomb. ed. 2, p. 251; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 491.—Flowers: Aug.-Oct. VERN. *Amti-vel.*

Common in hedges throughout the Presidency. KONKAN: *Law*! DECCAN: Gokak, *Woodrow*. KANARA: *Thomson*!; hedges near the sea-coast of N. Kanara, *Talbot*. GUJARAT: Surat, *Cooke*!; Baroda, *Cooke*!; Godra, *Cooke*!; Porbandar (Kathiawar), *Woodrow*.—DISTRIB. Throughout India; Ceylon, Malaya.

VAR. *stipulacea*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 209. Leaves usually smaller, narrower, apiculate, angled or sagittate at the base with acute lobes; petioles often with stipule-like leaves in the axils; flowers rather smaller. *Ipomœa stipulacea* (sp.), Sweet, Hort. Brit. ed. 2, p. 372 (*not* of Jacq.); Grah. Cat. p. 131.

KONKAN: Mumbra near Thana, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 488! GUJARAT: Baroda, *Cooke*!

13. **Ipomœa staphylina,** *Rœm. & Schult. Syst. Veg.* v. 4 (1819) p. 249. Perennial, woody below; stems short, subscandent, straggling, glabrous. Leaves 2–5 by 1¼–3 in., ovate, subacute, glabrous, subcordate at the base; main nerves 8–10 pairs, conspicuous beneath and with reticulate veins between; petioles 1–3 in. long, slender. Flowers numerous, in lax panicles which are usually longer than the leaves; bracts small, caducous; pedicels ⅛–⅜ in. long, slender. Sepals equal, ⅛ in. long, orbicular-oblong, glabrous, chartaceous, concave, much imbricate. Corolla ¾–1 in. long, tubular-campanulate, nearly white at the mouth, purple in the tube. Filaments hairy at the very base. Ovary ovoid, acute, glabrous. Capsules ⅓ in. long, ovoid, subacute, glabrous. Seeds 4, clothed with long silky hairs. Fl. B. I. v. 4, p. 210; Trim. Fl. Ceyl. v. 3, p. 219; Talb. Trees, Bomb. ed. 2, p. 251; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171. *Ipomœa racemosa*, Roth, Nov. Pl. Sp. (1821) p. 115 (*not* of Poir); Wight, Ill. t. 168.—Flowers: Dec.-Jan.

Rare. DECCAN: Kolhapur, *Col. Hobson*!; Byadgi, *Woodrow*. S. M. COUNTRY: on the banks of nálas in the southern parts of the Dharwar districts, *Talbot*.—DISTRIB. India (W. Peninsula, Assam); Penang.

14. **Ipomœa campanulata,** *Linn. Sp. Pl.* (1753) p. 160. A large climber; stems twining, suffruticose, terete, striate, much-branched, the older glabrous, the younger finely pubescent. Leaves 3–6 by 2½–5½ in., broadly ovate or suborbicular, acuminate, apiculate, thick, glabrous or finely pubescent on both sides; main nerves 12–14 pairs,

conspicuous beneath; petioles 1½–3 in. long, softly velvety. Flowers in corymbosely branched, usually many-flowered cymes; peduncles 1-4 in. long, stout; bracts quickly deciduous; pedicels 1 in. long and more, thickened in fruit. Sepals subequal, nearly ½ in. long, orbicular-oblong, obtuse, glabrous or finely pubescent, somewhat succulent, a little enlarged in fruit. Corolla tubular-campanulate, 3 in. long, pale-violet, dark-purple within the tube; lobes of the limb usually conspicuous. Capsules ½ in. in diam., globose, glabrous, enclosed in the enlarged sepals. Seeds with silky hairs which often exceed ½ in. long. Fl. B. I. v. 4, p. 211; Grah. Cat. p. 131; Dalz. & Gibs. p. 165; Trim. Fl. Ceyl. v. 3, p. 221; Talb. Trees, Bomb. ed. 2, p. 251; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.—Flowers: Oct.-Mar. VERN. *Tambarvel*; *Tugelmi*.

KONKAN: *Law*!; hilly parts, *Graham*; Wari jungles, *Dalzell & Gibson*. DECCAN: Máwal (Poona districts), *Woodrow*; Fitzgerald Ghát, below Mahableshwar, *Cooke*! S. M. COUNTRY: Dharwar, *Woodrow*; Belgaum, *Ritchie*, 473! KANARA: Halihal (N. Kanara), *Talbot*!—DISTRIB. India (W. Peninsula); Ceylon, Malaya.

15. **Ipomœa obscura,** *Ker-Gawl. in Bot. Reg.* (1817) t. 239. Annual; stems very long and slender, often purplish, twining, glabrous or with a few spreading hairs. Leaves 1–2½ by ¾–2 in., broadly ovate, acuminate, subacute, entire, glabrous or more or less pubescent, thin; petioles 1–3 in. long, slender, glabrous or pubescent. Flowers rather small, 1 or 2 (rarely 3) together; peduncles 1–2¼ in. long; bracts minute, linear-lanceolate; pedicels ¼–1¼ in. long. Sepals ⅜ in. long, subequal, oblong, subacute, shortly apiculate, minutely verrucose, veined. Corolla infundibuliform, ⅞ in. long, yellow, or white with the plaits yellowish, with a small purple eye; mouth of limb wide, 1 in. in diam. with shallow apiculate lobes. Capsules ⅓ in. long, ovoid, subacute, glabrous. Seeds dark-brown, velvety. Fl. B. I. v. 4, p. 207; Grah. Cat. p. 131; Dalz. & Gibs. p. 166; Trim. Fl. Ceyl. v. 3, p. 220; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 488.—Flowers during the greater part of the year. VERN. *Pungali*.

KONKAN: common about Bombay, *Graham, Dalzell & Gibson*. DECCAN: *Dalzell & Gibson, Dr. Lush* ex *Graham*; Poona, *Cooke*!, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 485!; Badami, *Woodrow*; Dharwar, *Cooke*! GUJARAT: *Woodrow*.—DISTRIB. Throughout India; Ceylon, Malaya, Mascarene Islands, Africa.

16. **Ipomœa biloba,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 44. Root large, long, with a thick brown bark; stems numerous, very long, prostrate, weak, rarely twining, cylindric, glabrous. Leaves 1½–2¼ by 2–3 in., usually broader than long, usually deeply 2-lobed (the division often extending half-way down, though sometimes the leaf is merely emarginate), fleshy, conspicuously parallel-veined, glabrous, cuneate or truncate at the base; petioles 1–3½ in. long, glabrous. Flowers large, usually solitary (sometimes 2–3); peduncles erect, 1–4½ in. long; bracts beneath the pedicels lanceolate, caducous; pedicels ⅝–1¾ in. long, stout. Calyx glabrous, the 2 outer sepals smaller than the inner, ⅓ by ¼ in., oblong, obtuse, apiculate, the 3 inner ½ by ⅜ in., elliptic-oblong, obtuse or emarginate, apiculate. Corolla 1½–2 in. long, tubular-infundibuliform, brilliant rose-purple with a deeper color in the tube, glabrous; lobes shallow, acute, apiculate. Filaments dilated and hairy at the base.

Ovary glabrous. Capsules ½–⅝ in. long, ovoid, glabrous. Seeds villous. Fl. B. I. v. 4, p. 212; Jackson, in Index Kewen. v. 1 (1893) p. 1223; Trim. Fl. Ceyl. v. 3, p. 224; Talb. Trees, Bomb. ed. 2, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 482. *Ipomœa Pes-caprœ*, Sweet, Hort. Suburb. (1818) p. 35; Roth, Nov. Pl. Sp. (1821) p. 109; Grah. Cat. p. 130; Dalz. & Gibs. p. 164; Aitch. Pb. & Sind Pl. p. 99. *Convolvulus Pes-caprœ*, Linn. Sp. Pl. (1753) p. 159.—Flowers more or less throughout the year. VERN. *Maryádvel*; *Samudraphen*.

Common throughout the Presidency on sandy shores and sandy river-banks, where it serves to bind the sand.—DISTRIB. Sea-shores of both hemispheres throughout the Tropics.

The leaves of the plant are employed as an external application in rheumatism. See Watt, Dict. Econ. Prod. l. c.

17. **Ipomœa dissecta,** *Willd. Phytogr.* (1794) p. 5, t. 2, fig. 3. Annual, glabrous, with a short stout stem and numerous prostrate slender angular branches 6–24 in. long, not or rarely twining. Leaves very variable, digitate, or the upper sometimes pedate; lobes 3–7, linear-lanceolate, irregularly and acutely serrate; petioles ¼–½ in. long, with axillary stipule-like leaves at their base. Flowers usually solitary; peduncles ½–1½ in. long; bracts near the flower minute, lanceolate, acute, or flowers subsessile among leaf-like pectinate bracts. Sepals ⅓ in. long, oblong-lanceolate, glabrous but rough outside with prominences, cuspidate, recurved at the apex. Corolla white, tubular, ⅓–½ in. long, glabrous, acutely 5-lobed. Ovary 3-celled. Capsules ⅛–¼ in. in diam., subglobose, glabrous, 3- or 6-valved. Seeds usually 3, pubescent. Fl. B. I. v. 4, p. 200; Jackson, in Index Kewen. v. 1, p. 1224; Trim. Fl. Ceyl. v. 3, p. 213. *Ipomœa coptica*, Roth, Nov. Pl. Sp. (1821) p. 110; Grah. Cat. p. 132; Dalz. & Gibs. p. 166. *Convolvulus copticus*, Linn. Mant. 559.

I have seen no authentic specimen of this plant from the Bombay Presidency, the specimens supposed to be *I. dissecta* being all referable to *I. laciniata*, Dalz. Graham (Cat. l. c.), whom Dalzell and Gibson follow (Bo. Fl. l. c.), gives it as occurring in open glades at Khandala, a locality which has been so thoroughly examined that the plant could scarcely have escaped notice. *Ipomœa laciniata*, Clarke, occurs at Khandala, and I think Graham has mistaken this for *I. dissecta* and been followed in his error. The corolla of *I. dissecta* is much smaller than that of *I. laciniata*, which latter has a long narrow corolla-tube.—DISTRIB. W. India (not common); Ceylon, Tropical Africa, Australia.

18. **Ipomœa digitata,** *Linn. Syst. Nat.* ed. x. (1759) p. 924 (*not* of Parodi). Perennial, with large ovoid or elongated tuberous roots; stems long, thick, twining, tough, glabrous. Leaves 4–6 in. long, often broader than long, deeply palmately divided; lobes 5–7, ovate-lanceolate, acute or acuminate, glabrous, entire, pale and with prominent nerves beneath; petioles 2–5 in. long, glabrous. Flowers in many-flowered corymbosely paniculate cymes; peduncles solitary, axillary, sometimes exceeding 6 in. long, stout; bracts minute, deciduous; pedicels ¼–¾ in. long. Sepals ¼–⅓ in. long, orbicular-oblong, subobtuse, concave, glabrous. Corolla purple, 1½–2½ in. long, campanulate-infundibuliform; lobes of the limb emarginate. Ovary 4-celled, glabrous. Capsules ovoid, ⅓–½ in. long, 4-celled, 4-valved, surrounded by the enlarged rather fleshy sepals. Seeds clothed with brownish cottony readily detachable hairs, nearly ¼ in. long. Fl. B. I. v. 4, p. 202; Jackson, in Index Kewen.

v. 1 (1893) p. 1224; Trim. Fl. Ceyl. v. 3, p. 212; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 484. *Ipomœa paniculata*, R. Br. Prodr. (1810) p. 486. *Convolvulus paniculatus*, Linn. Sp. Pl. (1753) p. 156. *Batatas paniculata*, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6, p. 436; Grah. Cat. p. 129; Dalz. & Gibs. p. 167.—Flowers: July–Sept.

Doubtfully indigenous. KONKAN: *Law*!; Malabar Hill (Bombay), *Graham*; Mahim woods, *Graham*; Cross Island, abundant, *Graham*; Kalyan, *Woodrow*.—DISTRIB. Throughout tropical India in moist regions; Ceylon, Tropical Asia, Africa, America, Australia in moist climates.

19. **Ipomœa laciniata,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 200. Stem slender, creeping or twining, angled and twisted, glabrous. Leaves 1–2 in. in diam., subdigitate, 5–7-partite; segments elliptic or linear, serrate or pinnatifid, the teeth unequal, mucronate; petioles ½–1 in. long with stipule-like axillary leaves. Flowers 1–3 (usually 1) on axillary peduncles; peduncles solitary, variable in length, ½–1½ in. long, thickened upwards in fruit; bracts ⅛ in. long, linear-lanceolate, acute. Sepals ¼–⅓ in. long, subequal, elliptic, mucronate, fleshy, ribbed and wrinkled on the back, glabrous. Corolla white; tube narrow, cylindric, reaching 2 in. long by ⅛ in. in diam.; limb flat, spreading, 1–1½ in. in diam. Anthers scarcely exserted. Ovary 3-celled. Capsules ⅓ in. in diam., subglobose, 3-celled. Seeds normally 6, shortly silky. Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 171. *Ipomœa dissecta*, Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171 (*not* of Willd.). *Pharbitis laciniata*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 178; Dalz. & Gibs. p. 167.—Flowers: Oct.

Flowers open at sunset (*Dalzell*).

KONKAN: *Stocks*!; Malwán, *Dalzell*!; Savantvádi, *Woodrow*. DECCAN: Mahableshwar, *Cooke*!; Khandala, *Cooke*!; Panchgani, *Cooke*!, *Woodrow*! S. M. COUNTRY: near Belgaum, *Ritchie*, 1888!—DISTRIB. India (W. Peninsula).

20. **Ipomœa palmata,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 43. Perennial, glabrous; stems numerous, twining, the older semi-woody and often rough with lenticels. Leaves 1–2 in. long and as broad as long, palmately cut almost to the base into 3–7 (usually 5) oblanceolate obtuse mucronate glabrous segments; petioles ½–2 in. long. Peduncles short, usually 1–3-flowered, curved downwards; bracts minute; pedicels ¼–½ in. long, erect and thickened in fruit. Sepals ¼ in. long, elliptic-oblong, obtuse, chartaceous, glabrous outside, dotted with whitish specks inside and with membranous margins. Corolla 1¼–2 in. long, dull-violet with a purple tube, widely infundibuliform. Capsules ⅜ in. in diam., subglobose, glabrous, 2-celled. Seeds pubescent with a marginal fringe of long white silky hairs. Fl. B. I. v. 4, p. 214; Trim. Fl. Ceyl. v. 3, p. 225; Talb. Trees, Bomb. ed. 2, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172. *Ipomœa pulchella*, Roth, Nov. Pl. Sp. (1821) p. 115; Wight, Icon. t. 156.—In flower most of the year.

KONKAN: *Stocks*! S. M. COUNTRY: Badami, *Woodrow*!, *Cooke*! KANARA: *Law*!; N. Kanara near the sea-coast, *Talbot*. GUJARAT: Baroda, *Woodrow*! Often cultivated in gardens.—DISTRIB. India (W. Peninsula); Ceylon, Tropics generally.

21. **Ipomœa pes-tigridis,** *Linn. Sp. Pl.* (1753) p. 162. Stems twining, clothed with long spreading hairs. Leaves 1½–4 in. in diam.,

rotundate in outline, usually more or less deeply palmately 5-9-lobed, sometimes 3-lobed or occasionally entire; lobes ovate, acute or acuminate, narrowed at the base, hirsute on both surfaces; petioles 1½–3 in. long, hairy. Flowers sessile, 3 or more in a head; peduncles 1–3 in. long, very hairy; outer bracts nearly 1 in. long, the inner about ⅜ in. long, all ovate-oblong, subobtuse, very hairy. Sepals ⅓–½ in. long, densely hairy and ciliate with long stiff hairs, the 2 outer sepals broader than the inner, ovate-lanceolate, the 3 inner linear-oblong, acute. Corolla about 1 in. long, tubular-campanulate, white or pale pink. Capsules ⅕ in. in diam., globose, glabrous, papery, concealed in the calyx. Seeds grey-pubescent. Fl. B. I. v. 4, p. 204; Grah. Cat. p. 132; Dalz. & Gibs. p. 165; Wight, Icon. t. 836; Trim. Fl. Ceyl. v. 3, p. 216; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 488.—Flowers: Sept.–Nov.

Common in hedges, *Dalzell & Gibson*. KONKAN: *Law*!, *Stocks*!; Marmagão, *Cooke*!; Shrivardhan, *Woodrow*! DECCAN: Junnar, *Kanitkar*! S. M. COUNTRY: Padshapur, *Ritchie*, 1894! GUJARAT: Godra, *Cooke*!; Chandod, *Kanitkar*!—DISTRIB. More or less throughout India; Ceylon, Malaya, China, Polynesia, Tropical Africa.

VAR. *hepaticifolia*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 204, cannot stand as a variety, inasmuch as 3-lobed and even entire leaves may sometimes be found on the same plant together with the 7-lobed ones.

Many plants of the genus are cultivated in the Presidency either as useful or ornamental plants, of which the principal are the following:—

Ipomœa Batatas, Poir, Encyc. Méthod. v. 6 (1804) p. 14. The well-known *Sweet Potato*, originally a native of Tropical America, cultivated as a vegetable throughout India. There are 2 forms, one with white and the other with red flowers and tubers. Fl. B. I. v. 4, p. 202; Woodr. in Journ. Bomb. Nat. v. 11 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 478. *Batatas edulis*, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 435; Grah. Cat. p. 129.—VERN. *Ratálu*; *Kanangi*.

Ipomœa tuberosa, Linn. Sp. Pl. (1753) p. 160. A climber of rapid growth often called *The Spanish Arbor-vine*, grown as an ornamental plant in gardens. It has large dark-green digitate leaves and a profusion of golden-yellow flowers which appear in the cold season. It is easily propagated by seed, but does not flower the first season after sowing. Woodr. Gard. in Ind. ed. 5, p. 394.

Ipomœa carnea, Jacq. Enum. Pl. Carib. (1760) p. 13. A shrub, not twining, suberect and supporting itself to 5 or 6 ft. high; in the woods of S. America, of which it is a native, climbing to a height of 20 ft. Corolla showy, pale rose-colored with a long tube. Introduced into many gardens in the Bombay Presidency. Woodr. Gard. in Ind. ed. 5, p. 391.

Ipomœa Leari, Paxt. Mag. Bot. v. 6 (1839) p. 267. A handsome twiner, a native of Tropical America, a favorite ornament of verandahs

and trellises. It has large dark-blue flowers which become reddish as they fade. Woodr. Gard. in Ind. ed. 5, p. 392. *Pharbitis Learii*, Dalz. & Gibs. Suppl. p. 58.

Ipomœa hederacea, Jacq. Collect. v. 1 (1786) p. 124. A twiner with hairy stems, common in gardens and sometimes found as an escape. Probably an American plant, naturalized in the Old World (*Clarke*). It has ovate, cordate, 3-lobed leaves and a light-blue corolla. Fl. B. I. v. 4, p. 199; Trim. Fl. Ceyl. v. 3, p. 212; Jackson, in Index Kewen. v. 1, p. 1225; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171. *Convolvulus hederaceus*, Linn. Sp. Pl. (1753) p. 154. *C. Nil*, Linn. Sp. Pl. ed. 2 (1762) p. 219.

Ipomœa Horsfalliæ, Hook. Bot. Mag. (1834) t. 3315. A glabrous twiner a native of the West Indies with deeply-divided palmate leaves and a corolla of a deep rich rose-color. It is occasionally grown in gardens but is not easy of propagation. Woodr. Gard. in Ind. ed. 5, p. 392.

Ipomœa dasysperma, Jacq. Eclog. v. 1 (1811–1816) p. 132, t. 89. A glabrous twiner with pedately-divided leaves and sulphur-yellow flowers with a purple tube, cultivated in gardens, sometimes found as an escape. Fl. B. I. v. 4, p. 215; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172.

Ipomœa purpurea, Roth, Bot. Abhand. (1787) p. 27. A very showy plant, probably introduced from Tropical America, often grown to ornament trellises &c. Its flowers are of every shade from nearly white to dark-purple. Fl. B. I. v. 4, p. 200; Woodr. Gard. in Ind. ed. 5, p. 393.

Ipomœa rubro-cœrulea, Hook. Bot. Mag. (1834) t. 3297. A handsome species with large blue or white flowers, a native of Mexico, often cultivated in gardens. Woodr. Gard. in Ind. ed. 5, p. 393.

15. **CALONYCTION,** Choisy.

Large herbaceous climbers; stems usually muricate. Leaves large, cordate, entire or angled. Flowers 1–5 in axillary cymes; bracts caducous. Sepals 5, herbaceous, smooth, usually aristate, subequal or the outer smaller. Corolla large, glabrous, white or rose-purple, hypocrateriform; tube long, narrow, many times longer than the sepals; limb plicate. Stamens 5, exserted. Ovary 2-celled; ovules 4; style filiform; stigma 2-globose. Capsule 4-valved. Seeds 4, glabrous.—DISTRIB. Tropical Asia, Africa and America; species 4.

Corolla pure white; seeds yellow	1. *C. speciosum.*
Corolla rose-purple; seeds black	2. *C. muricatum.*

1. **Calonyction speciosum,** *Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv.* v. 6 (1834) p. 441. A large glabrous twiner climbing to a great height; stems often muricate (sometimes almost prickly). Leaves large, 3–7 in. long, broadly ovate, acuminate, entire, glabrous, thin, base deeply cordate with broad rounded basal lobes; petioles about as long as the leaves. Peduncles 2–6 in. long, glabrous, 1–5-flowered; bracts caducous; pedicels usually short, stout. Sepals subequal in length, ½ in.

long, ovate, strongly mucronate, the 2 inner broader than the 3 outer. Corolla pure white, the bands sometimes greenish; tube 3–3½ in. long, narrow; limb 3–5 in. in diam. Anthers shortly exserted. Capsules ovoid-oblong, about 1 in. long, narrowed upwards. Seeds irregularly trigonous, ½ in. long, glabrous, polished, yellow. Dalz. & Gibs. p. 164; Wight, Icon. t. 1361. *Calonyction Bona-nox*, Boj. Hort. Maur. (1837) p. 227. *C. Roxburghii*, G. Don, Gen. Syst. v. 4 (1837) p. 263; Grah. Cat. p. 130. *Ipomœa Bona-nox*, Linn. Sp. Pl. ed. 2 (1762) p. 228; Trim. Fl. Ceyl. v. 3, p. 213; Talb. Trees, Bomb. ed. 2, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 483. *I. Bona-nox*, var. *grandiflora*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 197. *I. grandiflora* (sp.), Roxb. Hort. Beng. (1814) p. 14.—Flowers: Oct.–Nov. VERN. *Gulchándni.*

Doubtfully wild, frequently found near villages and houses. Cultivated for its large white fragrant flowers, which open in the evening and wither before noon next day. Called *Moon-flower* by Anglo-Indians.—DISTRIB. More or less throughout India; Ceylon, Tropical Africa, E. Asia.

2. **Calonyction muricatum,** *G. Don, Gen. Syst.* v. 4 (1837) p. 264. A large twiner; stems often muricate. Leaves 3–6 by 2½–5 in., broadly ovate, acuminate, glabrous, entire, base deeply cordate with rounded lobes; petioles 3–6 in. long. Peduncles 1–5-flowered, variable in length; bracts caducous; pedicels usually much thickened upwards in fruit. Sepals ½–⅝ in. long, elliptic-oblong, aristate, subequal in length, the 3 outer much broader than the 2 inner. Corolla 2–3 in. long, rose-purple; tube 1–2 in. long, hairy within. Anthers not twisted. Capsules ½–⅔ in. in diam., globose, apiculate. Seeds ⅜ in. long, smooth polished, black. Grah. Cat. p. 130. *Ipomœa muricata*, Jacq. Hort. Schœnb. v. 3 (1798) p. 40, t. 323 (*not* of Cav.); C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 197; Trim. Fl. Ceyl. v. 3, p. 214; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 487.—Flowers: Sept.–Nov. VERN. *Gariya.*

Rarely if ever truly wild, often cultivated for the sake of the thickened pedicels which are eaten. KONKAN: on rubbish and in waste places about Bombay, *Graham.* DECCAN: Kartriz Ghát, *Woodrow.* S. M. COUNTRY: Belgaum, *Ritchie*, 1889!—DISTRIB. India (Himalayas extending from Kangra to Sikkim, Deccan hills); Ceylon, Japan.

16. **RIVEA,** Choisy.

Climbing shrubs. Leaves cordate, usually silky beneath (at least when young); petiole long. Peduncles axillary, 1–3 (sometimes 7)-flowered; bracts 2–3, narrow. Sepals 5, ovate or lanceolate-oblong, subequal. Corolla large, hypocrateriform; tube narrow, cylindric; lobes of the limb broad, rounded, plicate. Disk annular. Stamens 5, included; anthers narrow, oblong, not finally twisting. Ovary 4-celled; ovules 4; style filiform; stigmas 2, linear-oblong. Fruit a subglobose dry woody berry, or an irregularly opening capsule often 1-celled from the absorption of the septa. Seeds 1-4, glabrous, surrounded by mealy pulp.—DISTRIB. East Indies and S. America; species about 10.

Sepals ovate, obtuse; peduncles usually 1-flowered; leaves rarely broader than long	1. *R. hypocrateriformis.*
Sepals lanceolate, acute; peduncles usually 7-flowered; leaves usually broader than long	2. *R. ornata.*

1. **Rivea hypocrateriformis,** *Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv.* v. 6 (1834) p. 408. A large climber; stems terete, more or less silky-pubescent, Leaves 1½–2½ by 1¼–2¼ in., sometimes as broad as, but rarely broader than long, orbicular, obtuse, rarely mucronulate, glabrous or nearly so above, appressedly silky-hairy beneath, base usually cordate; petioles ½–2 in. long, silky. Peduncles very short, usually 1-flowered; bracts 2 at the apex of the peduncle; pedicels short, articulated to the peduncle. Sepals ⅓ in. long, ovate-elliptic, obtuse or subobtuse, silky-hairy. Corolla fragrant, 2½–3 in. long; tube very long; limb reaching 2 in. in diam., glabrous or with a few scattered hairs outside. Anthers ¼ in. long, linear-oblong. Stigmas ⅛ in. long, linear-oblong. Fruit ½ in. in diam., globose, mucronate by the style-base, chestnut-brown, glabrous, polished. Fl. B. I. v. 4, p. 184; Grah. Cat. p. 127; Dalz. & Gibs. p. 168; Aitch. Pb. & Sind Pl. p. 100; Talb. Trees, Bomb. ed. 2, p. 247; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170; Watt, Dict. Econ. Prod. v. 6, part 1, p. 557. *Rivea fragrans,* Nimmo, in Grah. Cat. p. 127. *R. Bona-nox,* Choisy, Convolv. Orient. (*l. c.*) p. 409; Dalz. & Gibs. p. 168.—Flowers: Aug.–Oct. VERN. *Phánji.*

KONKAN: *Law!, Graham.* DECCAN: Máwal (Poona districts), *Woodrow!*; Bowdhan near Poona, *Cooke!*; Ganesh Khind, *Woodrow!* SIND: common in the hills, *Stocks,* 486!; Jemadar ka Landa near Karachi, *Stocks,* 486!—DISTRIB. India (W. Peninsula, Assam). The leaves and young shoots are eaten as a vegetable. See Watt, Dict. Econ. Prod. l. c.

2. **Rivea ornata,** *Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv.* v. 6 (1834) p. 409. Climbing; stems stout, terete, finely silky-pubescent (especially when young) with white appressed hairs. Leaves 1½–4 in. long, usually broader than long, orbicular or reniform, obtuse, often apiculate or very shortly acuminate, glabrous above, more or less densely white-silky beneath, base cordate; petioles 1-3 in. long, densely silky. Peduncles stout, stiff, 1–3 in, long, white-silky, 1–7-flowered; bracts oblong, acute, fleshy, caducous; buds pointed, silky at the tip; pedicels short, stout, silky, articulated to the peduncle. Sepals ⅝–¾ in. long, ovate-lanceolate, acute or subacute, fleshy, silky-pubescent outside, persistent. Corolla at first white, afterwards becoming cream-colored, drying yellow (*Trimen*), sweetly fragrant; tube 1½–2 in. long; limb 2–2½ in. in diam.; lobes shallow, emarginate. Fruit subglobose, less than 1 in. in diam., mucronate by the style-base, glabrous, polished, brown. Fl. B. I. v. 4, p. 183; Grah. Cat. p. 128; Dalz. & Gibs. p. 168; Wight, in Calc. Journ. Nat. Hist. v. 8 (1847) p. 179, t. 5, fig. 1; Trim. Fl. Ceyl. v. 3, p. 205; Talb. Trees, Bomb. ed. 2, p. 247; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170; Watt, Dict. Econ. Prod. v. 6, part 1, p. 558.—Flowers: July–Sept.

Throughout the Presidency in deciduous forests, not common. KONKAN: Worli hill (Bombay), *Graham;* Salsette, *Graham.* DECCAN: Máwal (Poona districts), *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

17. **ARGYREIA,** Lour.

Climbing rarely suberect shrubs. Leaves ovate-cordate to narrow-lanceolate, usually pubescent or silky beneath. Flowers showy, purple or rose (rarely white), usually in many-flowered cymes, often capitate; bracts often conspicuous. Sepals 5, herbaceous, leathery and but little enlarged in fruit, often red within. Corolla infundibuliform or

somewhat tubular; limb plicate, more or less hirsute externally, shortly lobed. Stamens 5, included; anthers oblong, straight. Disk annular. Ovary 4-celled; ovules 4; style filiform; stigma 2-globose. Fruit a dry hard berry. Seeds 4 or fewer, embedded in mealy pulp.—DISTRIB. Tropical Asia and the Malayan Archipelago; species about 25.

Climbing or twining shrubs.
- Leaves glabrous above.
  - Leaves broadly ovate-cordate, 5–10 in. broad.
    - Leaves white-tomentose beneath ..... 1. *A. speciosa.*
    - Leaves glabrous or nearly so beneath, not white-tomentose ..... 2. *A. Hookeri.*
  - Leaves elongate-ovate with rounded base, less than 4 in. broad, sparsely hairy beneath ..... 3. *A. involucrata.*
- Leaves strigose or pubescent above.
  - Bracts with parallel nerves.
    - Bracts large, ovate-oblong, silky ..... 4. *A. sericea.*
  - Bracts not parallel-nerved.
    - Bracts linear.
      - Bracts $\frac{5}{8}$-$1\frac{1}{4}$ in. long, strigose with bulbous-based hairs ..... 5. *A. pilosa.*
      - Bracts $\frac{1}{3}$-$\frac{2}{3}$ in. long, softly pubescent ..... 6. *A. Lawii.*
    - Bracts suborbicular, $\frac{1}{2}$ in. in diam. ..... 7. *A. cymosa.*

An erect shrub with obovate cuneate leaves ..... 8. *A. cuneata.*

1. **Argyreia speciosa,** *Sweet, Hort. Brit.* ed. 1 (1827) p. 289. A very large climber; stems stout, white-tomentose. Leaves 3–12 by $2\frac{1}{2}$–10 in. (sometimes even larger), ovate, acute, glabrous above, persistently white-tomentose beneath, base cordate; petioles 2–6 in. long, white-tomentose. Flowers in subcapitate cymes; peduncles 3–6 in. long, stout, white-tomentose; bracts large, ovate-lanceolate with a long acumen, thin, veined, pubescent outside, glabrous inside, deciduous, the outer sometimes 2 in. long; pedicels very short, often almost 0, white-tomentose. Calyx white-tomentose outside; sepals nearly $\frac{2}{3}$ in. long, oblong-elliptic, obtuse. Corolla 2–$2\frac{1}{2}$ in. long, tubular-infundibuliform, the bands silky-pubescent outside; tube somewhat inflated, white-pubescent outside, rose-purple and glabrous inside. Ovary glabrous. Fruit $\frac{3}{4}$ in. in diam., globose, apiculate. Fl. B. I. v. 4, p. 185; Grah. Cat. p. 128; Dalz. & Gibs. p. 168; Trim. Fl. Ceyl. v. 3, p. 207; Talb. Trees, Bomb. ed. 2, p. 248; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170; Watt, Dict. Econ. Prod. v. 1, p. 310.—Flowers: Aug.–Sept. VERN. *Samudrashok.*

The *Elephant Creeper* of Anglo-Indians. A doubtful native in the Bombay Presidency, where it is found chiefly near villages. It is considered to be native in Bengal. It is cultivated for its large handsome leaves and beautiful rose-purple flowers.

KONKAN: *Graham, Stocks!, Law!* DECCAN: *Dalzell & Gibson.* S. M. COUNTRY: Belgaum, *Ritchie,* 1886!—DISTRIB. Throughout India, often cultivated; Java.

2. **Argyreia Hookeri,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 185. A large climbing shrub; stems grooved, glabrous or slightly pubescent. Leaves 6–8 by 5–6 in., broadly ovate, acute or acuminate, glabrous, base cordate with rounded lobes; main nerves 10–12 pairs, conspicuous beneath, not very oblique; petioles 4–5 in. long, grooved, glabrous or nearly so. Flowers in long-pedunculate few-flowered cymes; peduncles 6–8 in. long, grooved, more or less hairy; bracts $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{3}$–$\frac{1}{2}$ in., linear-oblong, obtuse or subacute, often apiculate, glabrous or pubescent; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long. Sepals ovate-lanceolate,

sparsely hairy on the back and with membranous margins, the outer rather more than ½ in. long, slightly narrower and longer than the inner. Corolla rose-colored, 2–2½ in. long, tubular-campanulate; tube 1 in. long, glabrous; limb 2–2½ in. wide at the mouth, with 5 acute lobes, the bands sparsely hairy with appressed hairs. Filaments hairy at the base; anthers ¼ in. long, oblong, obtuse. Berry ¾ in. in diam., globose. *Argyreia malabarica*, Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170 (*not* of Choisy).—Flowers: Aug.–Sept.

The bracts of the Bombay specimens are rather longer than those from the Himalayas and Assam and the sepals somewhat more unequal.

DECCAN: Mahableshwar, *Cooke*!, *Woodrow*; road between Mahableshwar and Panchgani, *Cooke*!—DISTRIB. Assam, Sikkim-Himalaya, Bhotan, W. Peninsula.

3. **Argyreia involucrata,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 187. A large twiner; stems clothed with appressed hairs. Leaves 4–7 by 1½–3½ in., ovate, acute or acuminate, glabrous or nearly so above, sparsely hairy beneath, base rounded or shallowly cordate (rarely subrhomboid); main nerves 8–10 pairs, conspicuous beneath; petioles 1–2½ in. long, usually hairy. Flowers in subcapitate cymes; peduncles ¾–3 in. long, hairy; bracts very variable, usually ¾–1¼ in. long (in an extreme case 2½ by 1 in.), oblong-lanceolate, acute, veined, thin, flat, sparsely hairy, the inner narrower than the outer. Sepals in flower unequal, the 2 outer exceeding ½ in. long, ovate-lanceolate, acuminate, hairy and with ciliate margins, the 3 inner ⅜ in. long, rather broader than the outer, ovate, acute, hairy on the back and with glabrous membranous margins. Corolla 2 in. long, tubular-infundibuliform; the bands hairy; tube glabrous within the calyx, sparsely hairy with long hairs beyond it; lobes of limb short, acute, with penicillate tips. Filaments hairy at the base. Fruit ½ in. in diam., globose. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170; var. *inæqualis*, C. B. Clarke, in Hook. f. Fl. B. I. (*l. c.*); Talb. Trees, Bomb. ed. 2, p. 248.—Flowers: Oct.

In the 'Flora of British India' (*l. c.*) the sepals are said to be subequal, but I have found them very distinctly unequal, even in the specimens in Herb. Kew. which have been named *A. involucrata* by Mr. Clarke. The outer bracts vary much in size, being especially large in some of the specimens collected near the coast. In a specimen collected by me near Marmagão the outer bract is 2½ by 1 in. These monstrous bracts are, however, by no means a constant character and vary on the same plant. The VAR. *inæqualis*, C. B. Clarke, cannot be maintained.

KONKAN: *Stocks*!; Collem (in Portuguese territory below Castlerock Ghát), *Woodrow*!; road from Vingorla to Wadi, *Woodrow*!; Marmagão, *Cooke*!, *Woodrow*! DECCAN: Wadi, below Mahableshwar, *Cooke*! KANARA: *Talbot*.—DISTRIB. India (W. Peninsula).

4. **Arygreia sericea,** *Dalz. in Dalz. & Gibs. Bo. Fl.* (1861) p. 169. A large silky twiner. Leaves 3–6 by 2–5½ in., broadly ovate, acuminate, hispid or strigose with appressed hairs above, densely silky, silvery-white beneath, base usually cordate with rounded lobes; main nerves 8–10 pairs, slender, usually conspicuous beneath; petioles 1–2 in. long, densely silky. Flowers 6–8, in capitate or subcapitate cymes; peduncles

1–4 in. long, silky; bracts large, foliaceous, with subparallel nerves, ovate-oblong, silky, the outer sometimes reaching 1¾ in. long; pedicels almost 0. Sepals densely hairy and ciliate, the 2 outer rather more than ½ in. long, linear-oblong, obtuse, the 3 inner about ⅓ in. long, elliptic-oblong, subacute. Corolla pink, 2½ in. long, tubular-infundibuliform; tube and bands hairy. Filaments hairy at the base; anthers sagittate. Berry ½ in. in diam., orange-colored. Fl. B. I. v. 4, p. 188; Talb. Trees, Bomb. ed. 2, p. 248; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170. *Ipomœa bracteata*, Grah. Cat. p. 131 (*not* of Don).—Flowers: Sept.–Oct. VERN. *Gável.*

Very close to *A. argentea*, Choisy.

KONKAN: *Stocks!, Law!*; S. Konkan, common, *Dalzell & Gibson*; Matheran, *Cooke!*; hills near Matheran, *Kanitkar!*; Dasgaon, *Woodrow!*; Chowk, *Graham.* DECCAN: Kartriz hills, *Kanitkar!*; high hills west of Junnar, *Dalzell & Gibson.* S. M. COUNTRY: hills south of Belgaum, *Ritchie*, 472!—DISTRIB. India (W. Peninsula).

5. **Argyreia pilosa,** *Wight & Arn. in Arn. Pugill. in Nov. Act. Nat. Cur.* v. 18, part 1 (1836) p. 356 c. A large patently hirsute twiner. Leaves 3–7½ by 2–6 in., ovate, acute, densely hirsute on both sides with hairs arising from bulbous bases, base rounded or cordate; petioles ¾–3 in. long. Flowers capitate, 2–6 in a head; peduncles variable in length, ½–4 in. long, hirsute; bracts ⅝–1¼ in. long, linear, subacute, hairy on both sides, the hairs usually from bulbous bases. Sepals nearly ½ in. long, subequal, lanceolate, acute, hairy on the back. Corolla dark-red or purple, 2 in. long, tubular-infundibuliform, hirsute on the bands, sparingly so on the tube; lobes of the limb short, acute, penicillate at the tip. Filaments long, filiform, hairy at the very base; anthers oblong, obtuse. Fruit ½–⅔ in. in diam. Fl. B. I. v. 4, p. 189; Talb. Trees, Bomb. ed. 2, p. 248; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.—Flowers: Sept.–Oct.

KONKAN: *Stocks!* S. M. COUNTRY: Belgaum (common), *Ritchie*, 473! KANARA: *Law!*; very common in the forests near Yellapur in moist shady places, *Talbot*; Yellapur, *Woodrow.*—DISTRIB. India (W. Peninsula).

6. **Argyreia Lawii,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1883) p. 190. Scandent; stems softly silky. Leaves 3–5 by 1¾–2¾ in., ovate, acute or acuminate, softly hairy on both surfaces with appressed hairs which are often silvery-white beneath, base rounded or rhomboid; petioles ¾–1¾ in. long. Flowers 3–9, in small, dense, dichotomous cymes with 1 flower in the fork; peduncles 2–5 in. long, slender, silky-white; bracts ⅓–⅔ in. long, linear, acute, pubescent, ciliate; pedicels very short. Sepals ¼ in. long, subequal, elliptic, subacute, hairy. Corolla 2 in. long, tubular-campanulate, hairy on the bands outside. Filaments short, dilated and densely hairy at the base. Fruit not seen. Talb. Trees, Bomb. ed. 2, p. 249.

Except a sheet in Herb. Kew. marked "North and South Konkan, Law," I have seen no specimen from the Bombay Presidency. Talbot has apparently not found the plant, as he gives no definite locality for it, while Woodrow does not include it in his list.

7. **Argyreia cymosa,** *Sweet, Hort. Brit.* ed. 1 (1827) p. 289. Scandent; stems terete, pubescent. Leaves 2–4 by 1¾–3 in., broadly ovate, shortly acuminate, pubescent on both sides, base cordate with

rounded lobes; petioles 1½–2½ in. long, hairy. Flowers in branched corymbose cymes sometimes reduced to simple heads; peduncles 1-4 in. long, hairy; bracts ½ in. in diam., suborbicular, persistent, softly pubescent. Calyx large; 3 outer sepals very broad, ½–⅔ in. long and sometimes nearly ½ in. wide, broadly obovate, oblong or suborbicular, obtuse or subacute, pubescent on both sides, veined; the 2 inner sepals almost as long as the outer but much narrower (⅕–¼ in. wide), oblong-lanceolate, subacute, softly pubescent on both sides. Corolla 2-2¼ in. long, tubular-infundibuliform, densely hairy on the bands outside. Stamens not exserted. Fruit ¾ in. in diam. Fl. B. I. v. 4, p. 190; Wight, Icon. t. 839; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.

Rare in the Bombay Presidency. KONKAN: North and South Konkan, *Law*!; Western Ghâts, *Woodrow*.—DISTRIB. India (W. Peninsula); Philippines.

8. **Argyreia cuneata,** *Ker-Gawl. in Bot. Reg.* v. 8 (1822) t. 661. A shrub, usually erect but with a tendency to climb when near support; stems softly silky-pubescent. Leaves 1½–4 by ⅜–1¾ in., obovate-oblong, obtuse, sometimes emarginate, usually shortly apiculate, glabrous or nearly so above, silky-hairy beneath, base cuneate; petioles ¼–⅓ in. long. Flowers in few-flowered (usually 3-flowered) cymes; peduncles 0–1½ in. long; bracts ¼–⅓ in. long, linear-lanceolate, acute, hairy. Sepals ⅕–¼ in. long, orbicular-ovate, obtuse, thick, pubescent outside. Corolla bright-purple, 2 in. long, tubular-infundibuliform, the bands hairy. Filaments short, dilated and hairy at the base. Fruit ½ in. long, ellipsoid, pointed, shining, yellowish-brown, nearly dry. Fl. B. I. v. 4, p. 191; Grah. Cat. p. 128; Dalz. & Gibs. p. 169; Talb. Trees, Bomb. ed. 2, p. 249; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 170.—Flowers: July-Sept. VERN. *Mahâlungi.*

Tolerably common in the dry districts of the Presidency. DECCAN: hills near Poona, *Woodrow*!; Mâwal districts common, *Dalzell & Gibson*; Bowdhan (Poona districts), *Cooke*!, *Kanitkar*! S. M. COUNTRY: *Ritchie*, 476!—DISTRIB. India (W. Peninsula).

IMPERFECTLY KNOWN SPECIES.

ARGYREIA MALABARICA, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 420. This plant, of which, according to Mr. C. B. Clarke (Hook. f. Fl. B. I. v. 4, p. 189), no authentic example has been seen by any author, I have not been able to find in the Bombay Presidency. There are 2 sheets in Herb. Kew. from Wight's herbarium which Wight has named *A. Leschenaultii,* but which Mr. Clarke considers to be the plant figured by Rheede (Hort. Mal. v. 11, t. 51) and to be *A. malabarica,* Choisy. The specimens on these sheets are destitute of flowers and were not collected in the Bombay Presidency. I cannot agree that they accord with Rheede's drawing. The leaves of Wight's n. 2353 do not resemble the leaves in Rheede's figure, the former having a truncate or cuneate base, the latter being deeply cordate. The young leaves in Wight's n. 2356 (distributed from Kew as *Argyreia Leschenaultii,* Wight, and numbered 1962) are very densely silky-pubescent; the older leaves in both of Wight's specimens (n. 2353 and n. 2356) are appressedly hairy with long bulbous-based hairs on the lower side. Graham (Cat. Bo. Pl. p. 128) describes the flowers as large and showy, cream-colored, with a deep purple bottom. I know of no *Argyreia* on the Bombay Ghâts (where Graham says it is pretty common) which fits in with this description. Dalzell & Gibson (Bo. Fl. p. 169) follow Graham and say that the plant is common on the Ghâts, but there are no specimens in Dalzell's herbarium at Kew. Dalzell & Gibson further describe the peduncles as many-flowered at the apex, whereas Rheede's figure shows them to be 3-flowered. Talbot does not include the plant in his list of trees, shrubs, and woody climbers,

while the plant, of which Woodrow (Journ. Bomb. Nat. v. 12 (1898) p. 170) gives Mahableshwar as the habitat and names *A. malabarica*, is *A. Hookeri*, Clarke. Trimen (Fl. Ceyl. v. 3, p. 228) says that Rheede's plant has been referred by Moon to *Breweria cordata*.

18. **LETTSOMIA,** Roxb.

Scandent more or less hairy shrubs. Leaves alternate, base rounded, rhomboid or cordate. Flowers in axillary pedunculate corymbose or capitate cymes; bracts usually conspicuous. Sepals 5, orbicular, elliptic or oblong, often thickened and somewhat enlarged in fruit. Corolla usually pink, tubular-infundibuliform; limb plicate; lobes small. Stamens 5, included or exserted; anthers oblong or linear, not finally twisted. Disk annular or cup-shaped. Ovary 2-celled; ovules 4; style filiform; stigma 2-globose. Fruit a dry berry. Seeds 4 or fewer, embedded in mealy pulp.—Distrib. East Asia and Tropical Africa; species 13.

Stamens exserted	1. *L. aggregata.*
Stamens included.	
Corolla glabrous or nearly so; fruit orange	2. *L. elliptica.*
Corolla densely strigose; fruit red	3. *L. setosa.*

1. **Lettsomia aggregata,** *Roxb. Hort. Beng.* (1814) p. 13. A climbing white- or yellowish-tomentose shrub (sometimes procumbent or diffuse, *Wight*); stems softly tomentose. Leaves 2–4½ by 1¾–4 in., ovate, usually obtuse, glabrous above, white- or yellowish-tomentose or woolly beneath, base shallowly cordate; main nerves prominent beneath; petioles 1–2 in. long, tomentose, grooved. Flowers in dense capitate cymes; peduncles shorter than the leaves, 0–2½ in. long, grooved, tomentose; bracts large, broad, orbicular-ovate, ⅓–½ in. long, densely silky-tomentose outside, glabrous inside, subpersistent; pedicels short or 0. Sepals oblong-obtuse, ⅜ in. long, densely silky-tomentose. Corolla pink, rather more than ½ in. long, tubular-campanulate; tube glabrous, ¼ in. long; limb $\frac{5}{16}$ in. long, deeply divided below the middle into 5 oblong emarginate lobes, each lobe furnished at the back with a densely hairy band, the margins of the lobes beyond the bands tender. Stamens and style much exserted. Filaments densely hairy at the base, with short stout hairs. Fruit ¼–⅓ in. in diam., smooth, red, surrounded by the enlarged, spreading, rather thick, concave sepals, which are hairy outside, glabrous, red and smooth within. Seeds greyish-black, smooth. Fl. B. I. v. 4, p. 191; Wight, Icon. t. 1359; Trim. Fl. Ceyl. v. 3, p. 209; Talb. Trees, Bomb. ed. 2, p. 249; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171. *Argyreia aggregata*, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 427; Grah. Cat. p. 128; Dalz. & Gibs. p. 169.—Flowers: Sept.-Dec.

Konkan: *Stocks!, Law!* S. M. Country: *Law* ex *Graham, Dalzell & Gibson*; Belgaum, *Ritchie*, 471!; Dharwar, *Talbot, Cooke!, Woodrow!* Kanara: drier parts of N. Kanara, *Talbot*; Kumpta, *Woodrow!*—Distrib. India (W. Peninsula); Ceylon.

2. **Lettsomia elliptica,** *Wight, Icon.* v. 4, part 2 (1850) p. 12. A large climber; young parts more or less pubescent; stems slender, woody below. Leaves 2½–4 by 1¼–2¾ in., often closely placed on numerous short branches, elliptic-lanceolate, acute, nearly glabrous

above, more or less hairy and pale beneath, base acute or rounded; main nerves slender, very oblique, curving towards the apex of the leaf-blade; petioles 1–2 in. long, pubescent. Flowers in lax corymbose or paniculate cymes; peduncles 1–3 in. long; pedicels $\frac{1}{4}$–$\frac{3}{4}$ in. long; bracts small, caducous. Sepals $\frac{1}{6}$–$\frac{1}{4}$ in. long, the 3 outer elliptic, obtuse, hairy, $\frac{1}{8}$ in. broad, the 2 inner orbicular, as broad as long or nearly so, pubescent on the back and with membranous glabrous margins. Corolla tubular-infundibuliform, 1–1$\frac{1}{2}$ in. long, rose-colored with a deep purple bottom, the bands slightly hairy, sometimes almost glabrous; tube glabrous; limb very slightly lobed. Stamens included; filaments dilated and hairy at the base. Fruit $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., depressed-globose, orange, surrounded by the slightly enlarged sepals. Fl. B. I. v. 4, p. 192; Trim. Fl. Ceyl. v. 3, p. 209; Talb. Trees, Bomb. ed. 2, p. 249; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171; Watt, Dict. Econ. Prod. v. 4, p. 632. *Argyreia elliptica*, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 417; Grah. Cat. p. 128; Dalz. & Gibs. p. 169.—Flowers: Sept.-Oct. VERN. *Bondvel.*

A very variable plant in the size of the flowers and their number in a cyme.

KONKAN: *Stocks*!, *Law*! DECCAN: Khandala, *Cooke*!; Western Ghâts, *Kanitkar*!; Fitzgerald Ghât below Mahableshwar, *H. M. Birdwood*; Koina valley below Mahableshwar, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 475!; Castlerock, *Cooke*!; KANARA: common in the Supa Ghât jungles, *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

3. **Lettsomia setosa,** *Roxb. Hort. Beng.* (1814) p. 13. A large climber; stems terete, thick, the older glabrous with a rough bark, the younger as well as the young branchlets appressedly strigose-hairy. Leaves 3–6 by 2–5 in., ovate, acute or acuminate, sparsely hairy on both surfaces, nearly glabrous when old, base usually cordate with rounded lobes; petioles 1–3 in. long. Flowers in dense hairy corymbose cymes; peduncles 2–8 in. long, stout, strigose with appressed hairs; bracts $\frac{1}{4}$ in. long, broadly ovate, obtuse, appressedly strigose; pedicels variable in length, strigose. Sepals subequal, $\frac{1}{3}$ in. long, thick, subfleshy, orbicular, densely appressedly strigose, the 2 inner with membranous margins. Corolla rose-colored, $\frac{3}{4}$–1$\frac{1}{4}$ in. long; tube contracted within the calyx and there glabrous, the upper portion beyond the calyx somewhat swollen and as well as the bands densely strigose; limb with short acute lobes. Stamens included; filaments much dilated and densely hairy at the base. Fruit $\frac{3}{8}$ in. long, ovoid, red. Fl. B. I. v. 4, p. 194; Wight, Icon. t. 1360; Talb. Trees, Bomb. ed. 2, p. 250; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171. *Argyreia setosa*, Choisy, Convolv. Orient. in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 425; Dalz. & Gibs. p. 168.—Flowers: Sept.-Dec. VERN. *Dudh-vel*; *Sâmbhar-yel.*

KONKAN: *Stocks*!, *Law*!; Narel below Matheran, *Woodrow*; Matheran, *H. M. Birdwood.* S. M. COUNTRY: Belgaum, south of Cheeta hill, *Ritchie*, 1129! KANARA: *Talbot.*—DISTRIB. More or less throughout India; Ceylon.

VAR. *minor*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1883) p. 194. Leaves 1–2 in. long; flowers capitate; peduncles 1–1$\frac{1}{2}$ in. long; corolla 1 in. long.

KONKAN: *Law*!, *Stocks*!

The following, not belonging to any of the genera described above, are grown in gardens as ornamental plants :—

Legendrea mollissima, Webb & Berthelot, Hist. Nat. Canar. v. 3, part 2, sect. 3, p. 27, t. 137. A strong climber, a native of the Canary Islands. It lives several years and develops a thick stem of a pale ash-color marked by deep furrows. The leaves are cordate, smooth, about 4 by 3 in., and the flowers are produced in great profusion in October. Woodr. Gard. in Ind. ed. 5, p. 395.

Quamoclit coccinea, Mœnch. Méthod. (1795) p. 453. A subscandent shrub with weak stems, a native of Tropical America. It has ovate cordate acute leaves and lax cymes of crimson flowers. *Quamoclit phœniceæa*, Choisy, in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 433; Dalz. & Gibs. Suppl. p. 59. *Ipomœa coccinea*, Linn. Sp. Pl. (1753) p. 160; Bot. Mag. (1794) t. 221; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 199; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171.

Quamoclit vulgaris, Choisy, in Mém. Soc. Phys. Genèv. v. 6 (1834) p. 434. A handsome twining glabrous annual, a native of Tropical America, very common in gardens throughout the Presidency and indeed throughout India. It has pinnate leaves with numerous filiform segments and bright red or sometimes white flowers 1 in. in diam. when expanded. Dalz. & Gibs. Suppl. p. 59. *Quamoclit pinnata*, Boj. Hort. Maurit. (1837) p. 224. *Ipomœa Quamoclit*, Linn. Sp. Pl. (1753) p. 159; Bot. Mag. (1794) t. 244; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 199; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 171 & Gard. in Ind. ed. 5, p. 397.—VERN. *Kámalatá*; *Ganesh-pushpa*.

ORDER LXXXIX. SOLANACEÆ.

Herbs or shrubs, erect, trailing or scandent (rarely trees). Leaves alternate, often in unequal pairs, rarely clustered, never truly opposite, entire, lobed or pinnate; stipules 0. Flowers regular, hermaphrodite (very rarely dicœcious), in lateral terminal axillary or extra-axillary cymes, or on solitary or clustered pedicels; bracts and bracteoles 0. Calyx inferior; limb usually 5 (rarely 3–10) -lobed or -toothed, usually persistent, often accrescent in fruit. Corolla infundibuliform, campanulate or rotate, often plicate; lobes 5 (rarely 10) or limb subentire. Stamens 5, on the corolla-tube; anthers ovate or oblong, dehiscing by apical pores or longitudinally. Ovary 2-celled or imperfectly 1- or 4-celled (rarely 3–5-celled); ovules many, on prominent peltate placentas; style linear; stigma capitate or very shortly lobed. Fruit a berry or a circumscissile or valved capsule, usually 2-celled, many-seeded. Seeds compressed, discoid, or subreniform, with peripheric embryo, or seeds scarcely compressed with a straight embryo.—DISTRIB. Warmer regions of the whole world; genera about 70; species about 1250.

Fruit a berry.
  Corolla plaited or the lobes valvate.
    Anthers opening by apical pores ..... 1. SOLANUM.
    Anthers dehiscing longitudinally.
      Calyx in fruit much enlarged, overtopping the berry.
        Pedicels solitary ..... 2. PHYSALIS.
        Flowers clustered, sessile or nearly so ..... 3. WITHANIA.

Corolla-lobes more or less imbricate.
Calyx and corolla small ..... 4. LYCIUM.
Fruit capsular.
Capsule 4-celled, 4-valved or subindehiscent.
Calyx in fruit circumscissile above the base ..... 5. DATURA.
Capsule circumscissile near the apex .... 6. HYOSCYAMUS.

1. **SOLANUM,** Linn.

Herbs or shrubs sometimes subscandent (rarely small trees), unarmed or prickly. Leaves alternate or subopposite, entire, lobed or pinnatisect, solitary or twin. Flowers in dichotomous or racemose lateral or terminal cymes. Calyx 5–10-lobed (rarely 4-lobed or subentire), unaltered or enlarged in fruit. Corolla rotate, rarely campanulate; tube short; limb plicate, usually 5-lobed. Stamens 5 (rarely 4–6) in the corolla-throat; filaments short; anthers oblong, often narrowed upwards, connivent in a short cone, opening by terminal pores or short slits. Ovary 2-celled, rarely (in cultivated forms) 3–4-celled; style columnar; stigma small. Berry small or large, globose or elongate. Seeds numerous, usually discoid; embryo peripheric.—DISTRIB. Warmer regions of the globe, most abundant in America; species more than 700.

Unarmed.

An annual herb; flowers in umbellate cymes ..... 1. *S. nigrum.*
Shrubs, undershrubs, or small trees.
Shrub or small tree 6–20 ft. high; flowers white in corymbose cymes ..... 2. *S. verbascifolium.*
Shrubs 3–6 ft. high; flowers purple.
Flowers in racemose cymes ..... 3. *S. pubescens.*
Flowers in lateral fascicles.
Calyx entire or obscurely 5-toothed..... 4. *S. bigeminatum.*
Calyx with 5–8 conspicuous teeth ..... 5. *S. denticulatum.*

Armed with prickles.

Herbs.
Leaves 6 in. or more long; berry ¾–1¼ in. in diam., densely clothed with long hairs ..... 6. *S. ferox.*
Leaves not exceeding 4 in. long; berry ½–¾ in. in diam., yellow, or white with green veins, glabrous ..... 7. *S. xanthocarpum.*
Shrubs or undershrubs.
Leaves entire, not prickly on the midrib.
A tall hoary-tomentose shrub reaching 12 ft. high; leaves 5–9 in. long..... 8. *S. giganteum.*
Leaves exceeding 2 in. long, more or less sinuately or pinnately lobed, prickly on the midrib.
Flowers hermaphrodite.
Berry ½ in. in diam., yellow ..... 9. *S. indicum.*
Male flowers in a raceme; female flowers solitary.
Berry ¾–1 in. in diam., yellow..... 10. *S. incanum.*
Leaves not exceeding 2 in. long.
Petioles and pedicels prickly.
Berry ¼–⅓ in. in diam., scarlet..... 11. *S. trilobatum.*
Petioles and pedicels not prickly.
Flowers in racemose cymes; pedicels ¼–⅓ in. long; calyx-teeth triangular; berry yellow ..... 12. *S. albicaule.*
Flowers in fascicles; pedicels ¾–1½ in. long, filiform; calyx-teeth linear; berry yellow ..... 13. *S. gracilipes.*

1. **Solanum nigrum,** *Linn. Sp. Pl.* (1753) p. 186. A variable annual; stem erect, glabrous or more or less pubescent, much divaricately branched. Leaves numerous, 1–3½ by ¾–2 in., ovate-lanceolate, subacute or acuminate, glabrous, thin, entire or sinuate-toothed, tapering into the petiole; petioles ¾ in. long. Flowers small, in extra-axillary subumbellate 3–8-flowered cymes; peduncles ¼–¾ in. long, slender; pedicels ¼–⅜ in. long, very slender. Calyx ⅛ in. long, glabrous or nearly so; lobes 5, oblong, obtuse, $\frac{1}{20}$ in. long, not enlarged in fruit. Corolla ⅙–⅓ in. long, divided more than ½-way down into 5 oblong subacute lobes. Filaments short, flattened, hairy at the base; anthers $\frac{1}{10}$ in. long, yellow, oblong, obtuse, notched at the apex. Ovary globose, glabrous; style cylindric, hairy. Berry ¼ in. in diam., globose, usually purplish-black, but sometimes red or yellow, smooth, shining. Seeds discoid, $\frac{1}{16}$ in. in diam., minutely pitted, yellow. Fl. B. I. v. 4, p. 229; Trim. Fl. Ceyl. v. 3, p. 231; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 172; Watt, Dict. Econ. Prod. v. 6, part 3, p. 263. *Solanum rubrum*, Mill. Gard. Dict. ed. 8, n. 4; Wight, Icon. t. 344. *S. incertum*, Dunal, Hist. Solan. p. 155; Grah. Cat. p. 137.—Flowers: Sept.–Jan. VERN. *Kángani.*

A weed, often occurring in cultivated ground.

KONKAN: Bombay, *Woodrow.* DECCAN: Poona, *Cooke!*, *Woodrow!*; Mahableshwar in cultivated ground, *Cooke!* S. M. COUNTRY: Rámghát, *Ritchie*, 508! SIND: *Stocks!*; Hydrabad, *Woodrow.*—DISTRIB. Throughout India common; Ceylon; all temperate and tropical regions of the world.

2. **Solanum verbascifolium,** *Linn. Sp. Pl.* (1753) p. 184. A shrub or small unarmed tree 6–20 ft. high, covered almost all over with a dense yellowish or grey tomentum of scurfy stellate hairs. Leaves 4–8 by 2–6 in., elliptic-lanceolate, acuminate, entire, velvety-pubescent above, densely woolly beneath, base acute or subrhomboid (rarely rounded); main nerves about 8 pairs; petioles ¾–1½ in. long. Flowers numerous, in woolly dichotomous corymbose cymes which are at first apparently terminal, afterwards becoming lateral; peduncles stout, 1–4 in. long; pedicels ⅛–⅜ in. long, stout. Calyx ¼ in. long, cup-shaped, densely stellately woolly; teeth at flowering-time $\frac{1}{10}$ in. long, broadly deltoid, acute, enlarged in fruit but not overtopping the berry. Corolla white, nearly ½ in. long, deeply divided; lobes ⅓ in. long, elliptic-lanceolate, acute, stellately hairy outside. Filaments flat, glabrous; anthers ⅛ in. long, oblong, obtuse. Ovary hairy; style glabrous. Berry ⅓ in. in diam., globose, yellow, covered with small stellate hairs. Seeds $\frac{1}{16}$ in. in diam., slightly rugose. Fl. B. I. v. 4, p. 230; Grah. Cat. p. 138; Dalz. & Gibs. p. 175; Trim. Fl. Ceyl. v. 3, p. 232; Talb. Trees, Bomb. ed. 2, p. 253; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Wight, Icon. t. 1398; Watt, Dict. Econ. Prod. v. 6, part 3, p. 273.—Flowers: July–Nov. VERN. *Kutri.*

DECCAN: Poona, *Kanitkar!*; Wai, *Cooke!* S. M. COUNTRY: about Dharwar, *Dr. Lush* ex *Graham.* KANARA: Supa subdivision of N. Kanara in deciduous forests, common, *Talbot.*—DISTRIB. Throughout India in the tropical and subtropical zone; Ceylon, Malaya, N. Australia, Tropical America.

3. **Solanum pubescens,** *Willd. Phytogr.* (1794) p. 5. A shrub 3–4 ft. high; young branches densely stellately pubescent, the older glabrous. Leaves 1½–4 by 1–2½ in., ovate, subacute, entire or more or

less sinuately lobed, the young leaves stellately woolly, the older becoming almost glabrous above, acutely decurrent into the petiole from a rounded or subcordate base; petioles 1–1¾ in. long, stellately pubescent. Flowers in woolly racemose cymes, apparently terminal at first but becoming leaf-opposed; peduncles ¼–¾ in. long; pedicels ½–1 in. long, thickened and elongating in fruit. Calyx ¼ in. long at flowering-time, stellately pubescent, divided about ½-way down; lobes lanceolate-oblong, acuminate. Corolla purple, ⅝ in. long, deeply divided; tube 1/10 in. long; lobes ovate-lanceolate, acute, slightly stellately pubescent outside, veined. Filaments very short, thick, glabrous; anthers ¼ in. long, oblong, obtuse, 1 of them longer than the other 4. Ovary glabrous; style longer than the stamens, curved, glabrous. Berry ⅓ in. in diam., glabrous, red. Seeds discoid, reaching ⅕ in. in diam., slightly muriculate. Fl. B. I. v. 4, p. 230; Wight, Icon. t. 1402; Trim. Fl. Ceyl. v. 3, p. 232; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173.—Flowers: Aug.–Nov.

A rare plant in the Bombay Presidency. S. M. Country: Badami, *Bhiva!*, *Cooke!*, *Woodrow*; Banicopa, *Bhiva!*—Distrib. India (W. Peninsula); Ceylon.

4. **Solanum bigeminatum,** *Nees, in Trans. Linn. Soc.* v. 17 (1837) p. 42. Suffruticose; branches quadrangular. Leaves 5–7 by 1¾–2¾ in., the lower solitary, the upper twin, membranous, elliptic-lanceolate, acuminate, entire, more or less scabrid above with short setæ, glabrous beneath, margins minutely ciliate, base very acute, decurrent on the petiole; main nerves 8–9 pairs, conspicuous beneath; petioles ½–2 in. long, glabrous. Flowers solitary or 2–6, in lateral fascicles (reduced umbels); pedicels ½–¾ in. long, slender, glabrous. Calyx 1/10 in. long, cup-shaped, entire or obscurely toothed, saucer-shaped in fruit, glabrous. Corolla pale-purple, ¼ in. long, deeply divided; tube 1/16 in. long; lobes ovate-oblong, acute, glabrous. Filaments filiform, 1/16 in. long, glabrous; anthers ⅛ in. long. Ovary glabrous; style glabrous or nearly so. Berry ⅓ in. in diam., red. Seeds 1/10–⅛ in. long, somewhat angular (not discoid), reticulately pitted, yellow. Fl. B. I. v. 4, p. 231; Trim. Fl. Ceyl. v. 3, p. 232; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173. *Solanum Neesianum*, Dalz. & Gibs. Bo. Fl. p. 175 (*not* of Wall.).—Flowers: Oct.

A rare plant. Konkan: *Gibson!* Deccan: Phunda Ghát, *Dalzell & Gibson*; Mahableshwar, *Woodrow*. S. M. Country: Rámghát, *Ritchie*, 1301!; Londa, *Cooke!*—Distrib. India (W. Peninsula).

5. **Solanum denticulatum,** *Blume, Bijdr.* (1825) p. 697. A shrub 3–6 ft. high, unarmed, much-branched; branches ash-colored, smooth, except for a few lenticels. Leaves 2–4½ by 1–2 in., the lower solitary, the upper often twin, one of the pair being smaller than the other, elliptic-lanceolate, acute or acuminate, the upper side sparsely clothed with short glandular setæ, the lower side subglabrous when mature, base acute, decurrent into the petiole; main nerves 6–8 pairs, conspicuous below, with reticulate venation between; petioles ¼–1 in. long, slender. Flowers in lateral fascicles (reduced umbels); pedicels ½ in. long, 1–4 together. Calyx sparsely pubescent; teeth 5–8 (when 5 at regular, when more than 5 often at irregular intervals), about 1/16 in. long, lanceolate-subulate, reaching nearly ½-way up the corolla. Corolla bluish-purple, ¼–⅓ in. long, deeply divided; tube 1/16–1/10 in. long; lobes ovate-oblong, acute. Berry ¼–⅓ in. in diam., red when ripe. Seeds 1/10–⅛ in. long, somewhat

angular (not discoid), reticulately pitted, yellow. Fl. B. I. v. 4, p. 231; Wight, Icon. t. 1397; Trim. Fl. Ceyl. v. 3, p. 232; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173.—Flowers: in flower and fruit throughout most of the year.

DECCAN: Mahableshwar, very common, *Cooke!*, *Woodrow.* — DISTRIB. India (mountains of the Western Peninsula); Ceylon, Malay Islands.

6. **Solanum ferox,** *Linn. Sp. Pl.* ed. 2 (1762) p. 267. Stem herbaceous, stout, 2–4 ft. high, densely clothed with long coarse, often stalked, usually fulvous stellate hairs, and copiously armed with straight slender prickles. Leaves usually 2 at a node and unequal, 6–11 by 4–8 in., broadly elliptic in outline, sinuately or pinnately cut into few short triangular lobes, softly stellately fulvous-hairy on both sides (very densely so beneath), armed with long erect yellow slender prickles on the nerves on both sides, base cordate, truncate, or more or less acute, often unequal-sided; main nerves 6–8 pairs; petioles 1½–2½ in. long, prickly and densely fulvous-hairy. Flowers solitary or in 2–6-flowered leaf-opposed densely hairy cymes; peduncles very short; pedicels ¼–½ in. long, densely stellately fulvous-hairy and usually with a few prickles. Calyx campanulate, ⅜ in. long, divided about ½-way down, densely stellately fulvous-hairy, slightly enlarged in fruit; teeth deltoid, acute. Corolla ¾ in. long, 5-partite; tube very short, 1/16 in. long; lobes ovate-lanceolate, acute, densely hairy outside. Anthers sessile or nearly so, linear-lanceolate, ⅛ *in. long, opening by small pores.* Ovary densely *hairy with long hairs*; style glabrous. Berry globose, ¾–1¼ in. in diam., *densely covered with long fulvous hairs.* Seeds 1/10 in. in diam., faintly *rugose with concentric rings.* Fl. B. I. v. 4, p. 233; Grah. Cat. p. 139; Wight, Icon. *t.* 1399; Trim. Fl. Ceyl. v. 3, p. 233; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 6, part 3, p. 257.

Rare. KONKAN: S. Konkan, *Nimmo* ex *Graham.* S. M. COUNTRY: 40 miles west of Belgaum, *Woodrow.*—DISTRIB. India (Assam, Birma, W. Peninsula); Ceylon, China.

7. **Solanum xanthocarpum,** *Schrad. & Wendl. Sért.* v. 1 (1795) p. 8, t. 2. A very prickly diffuse bright-green perennial herb, somewhat woody at the base; stem somewhat zigzag; branches numerous, the younger ones clothed with dense stellate tomentum; prickles compressed, straight, yellow, glabrous and shining, often exceeding ½ in. long. Leaves 2–4 by 1–2¼ in., ovate or elliptic, sinuate or subpinnatifid, obtuse or subacute, stellately hairy on both sides (especially so beneath), sometimes becoming nearly glabrous in age, armed on the midrib and often on the nerves with long yellow sharp prickles, base usually rounded and unequal-sided; petioles ½–1 in. long, stellately hairy and prickly. Flowers in extra-axillary few-flowered cymes sometimes reduced to a single flower; peduncles short; pedicels short, curved, stellately hairy. Calyx nearly ½ in. long, densely hairy and prickly; tube short, globose; lobes 7/16 in. long, linear-lanceolate, acute, prickly outside. Corolla purple, ¾ in. long; lobes deltoid, acute, hairy outside. Filaments 1/16 in. long, glabrous; anthers ⅛ in. long, oblong-lanceolate, opening by small pores. Ovary ovoid, glabrous; style glabrous. Berry ½–¾ in. in diam., yellow, or white with green veins, surrounded by the

enlarged calyx. Seeds $\frac{1}{16}$ in. in diam., glabrous. Fl. B. I. v. 4, p. 236; Trim. Fl. Ceyl. v. 3, p. 235; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173: Watt, Dict. Econ. Prod. v. 6, part 3, p. 273.—Flowers: June. VERN. *Bhuiringani*; *Káteringani*.

KONKAN: *Law*!; Elephanta, *Graham*. DECCAN: common; Poona, *Cooke*!, *Woodrow*! SIND: *Woodrow*.—DISTRIB. Throughout India; Ceylon, S.E. Asia, Malaya, Tropical Australia, and Polynesia.

The root is much used in Hindu medicine. The fruit is sometimes eaten. See Watt, Dict. Econ. Prod. l. c.

8. **Solanum giganteum,** *Jacq. Collect.* v. 4 (1790) p. 125. A shrub sometimes reaching a height of 12 ft., armed with broadly triangular prickles which are yellow towards the point and usually tomentose at the base; young branches, inflorescence, and underside of leaves clothed with dense close white stellate tomentum. Leaves 5–9 by $1\frac{1}{4}$–2 in., oblong-lanceolate, acute, entire, glabrous above when mature, base tapering into the petiole, often unequal-sided; main nerves about 12, impressed on the upper surface; petioles 1–$1\frac{1}{2}$ in. long. Flowers in dense lateral (often apparently terminal) paniculately corymbose cymes; peduncles stout, $\frac{1}{4}$–1 in. long; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long. Calyx $\frac{1}{5}$ in. long, densely floccosely tomentose; teeth thick, triangular, $\frac{1}{16}$–$\frac{1}{10}$ in. long. Corolla bluish-purple, $\frac{1}{3}$ in. long, deeply divided; tube $\frac{1}{12}$ in. long; lobes oblong-lanceolate, subacute, tomentose outside, glabrous inside. Filaments very short. Ovary glabrous; style glabrous. Berry $\frac{1}{3}$ in. in diam., supported on the slightly enlarged calyx, red when ripe. Seeds $\frac{1}{8}$ in. in diam., minutely muriculate. Fl. B. I. v. 4, p. 233; Grah. Cat. p. 138; Dalz. & Gibs. p. 175; Wight, Icon. t. 893; Trim. Fl. Ceyl. v. 3, p. 233; Talb. Trees, Bomb. ed. 2, p. 253; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173.—Flowers: Jan.-Mar. VERN. *Kutri*; *Chunna*.

Higher hills of the Presidency. DECCAN: hills about Pár, *Graham*; Harishchandragad, *Gibson* ex *Graham*; Mahableshwar, very common, *Cooke*!, *Woodrow*; hills 4000 ft., *Law*! S. M. COUNTRY: Castlerock, *Bhiva*!; Belgaum, *Ritchie*, 1302!—DISTRIB. India (W. Peninsula); Ceylon.

9. **Solanum indicum,** *Linn. Sp. Pl.* (1753) p. 187. A much-branched undershrub 1–5 ft. high, very prickly; prickles large, with a long compressed base, sharp, often slightly recurved; stem stout, often purple; branches covered with minute stellate hairs. Leaves 2–6 by 1–3 in., ovate in outline, acute, subentire or with a few large triangular-ovate subacute lobes, sparsely prickly on both sides, clothed above with simple hairs from bulbous bases intermixed with small stellate ones, covered below with small stellate hairs; base cordate, cuneate or truncate, often unequal-sided; petioles $\frac{1}{2}$–1 in. long, prickly. Flowers in racemose extra-axillary cymes; peduncles short; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, stellately hairy and prickly. Calyx $\frac{1}{3}$ in. long, stellately hairy; teeth triangular, $\frac{1}{16}$ in. long. Corolla $\frac{1}{3}$ in. long, pale-purple, clothed outside with darker purple stellate hairs; lobes $\frac{1}{5}$ in. long, deltoid-ovate, acute. Filaments very short, almost 0; anthers oblong-lanceolate, opening by small pores. Ovary often hairy at the top; style stellately hairy, curved at the apex. Berry $\frac{1}{3}$ in. in diam., globose, dark-yellow when ripe, glabrous or sometimes with a few stellate hairs at the apex. Seeds $\frac{1}{6}$ in. in diam., minutely

pitted. Fl. B. I. v. 4, p. 234; Grah. Cat. p. 138; Dalz. & Gibs. p. 174; Wight, Icon. t. 346; Aitch. Pb. & Sind Pl. p. 102; Trim. Fl. Ceyl. v. 3, p. 234; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 6, part 3, p. 258.—Flowers: Aug.–Oct. VERN. *Dorli*; *Mothi-ringani*; *Chinchurdi*.

Common in the Deccan and Konkan hills. DECCAN: Khandala, *Graham, Cooke*!, *Woodrow*!; Mahableshwar, *Cooke*!, *Woodrow*.—DISTRIB. Throughout Tropical India; Ceylon, Malaya, China, Philippines.

10. **Solanum incanum,** *Linn. Sp. Pl.* (1753) p. 188. A branched prickly shrub, densely clothed with soft stellate pale-fulvous hairs; prickles stout, very sharp, recurved, yellow, shining above, usually tomentose at the broad base. Leaves 3–4½ by 1¾–3 in., ovate-elliptic, subacute, sinuately lobed, velvety above with stellate fuscous hairs, densely fuscous-woolly below, sparsely prickly along the midnerve on both sides, rarely so on the lateral nerves, base subcordate or truncate, rarely cuneate; main nerves about 6 pairs; petioles ¾–1½ in. long, prickly. Peduncles lateral, usually paired, one bearing a solitary fertile flower, the other bearing a racemose cyme of male flowers. Calyx cup-shaped, densely stellately woolly, prickly in the fertile, usually not prickly in the sterile flowers, ⅓ in. long, divided less than ½-way down; lobes triangular, acute. Corolla pale-purple, nearly ¾ in. long; lobes ⅓ in. long, ovate, acute, stellately hairy on both sides, densely so on the outside, the interspaces between the hairy bands tender, glabrous. Filaments $\frac{1}{20}$ in. long, flattened, glabrous; anthers ⅓ in. long, narrowly oblong, opening by small pores. Ovary globose, hairy at the apex; style hairy below. Berry ¾–1 in. long, ovoid or subglobose, yellow. Seeds $\frac{1}{10}$ in. in diam., minutely pitted. Forsk. Fl. Ægypt.-Arab. (1775) p. 46. *Solanum sanctum*, Linn. Sp. Pl. ed. 2 (1762) p. 269; Aitch. Pb. & Sind Pl. p. 103. *S. coagulans*, Forsk. Fl. Ægypt.-Arab. p. 47; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 236; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 6, part 3, p. 256.—Flowers: Jan.–May.

SIND: *Dalzell*!; near Karachi, *Bhola*!, *Woodrow*.—DISTRIB. India (Panjáb, W. Peninsula); S.W. Asia, Arabia, Egypt.

11. **Solanum trilobatum,** *Linn. Sp. Pl.* (1753) p. 188. An undershrub 6–12 ft. long, trailing or subscandent by its numerous hooked prickles; stems slender; branches long, divaricate, the young ones sometimes with a few stellate hairs, the older glabrous; prickles from a broad triangular base, very sharp, compressed, hooked, decurved. Leaves 1–2 by ¾–1½ in., ovate or rotund-ovate, obtuse, irregularly sinuate or 3–5-lobed, sparsely stellately hairy or glabrous, with or without 2 or 3 prickles on the midrib, base not cordate; petioles ½–1½ in. long., prickly. Flowers large and showy, violet-purple, in extra-axillary racemose cymes; peduncles very short, almost 0; pedicels ½–1 in. long, often prickly. Calyx cyathiform, ⅛–⅙ in. long, stellately hairy; teeth $\frac{1}{20}$ in. long, triangular, acute. Corolla exceeding ½ in. long; tube $\frac{1}{12}$ in. long; lobes oblong-lanceolate, acute, stellately hairy outside, usually reflexed. Filaments $\frac{1}{20}$ in. long; anthers ⅓ in. long, narrowly oblong, opening by small pores. Ovary ovoid or subglobose, glabrous; style glabrous. Berry ¼–⅓ in. in diam., scarlet when ripe.

Seeds $\frac{1}{8}$ in. in diam., slightly pitted. Fl. B. I. v. 4, p. 236; Grah. Cat. p. 138; Dalz. & Gibs. p. 175; Wight, Icon. t. 854; Trim. Fl. Ceyl. v. 3, p. 236; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 6, part 3, p. 264.—Flowers: Dec.–Jan.

DECCAN: Bijapur, *Cooke*!; Ahmednagar, *Cooke*! S. M. COUNTRY: Badami, *Kanitkar*!, *Woodrow*; Dharwar, *Woodrow*. GUJARAT: *Gibson* ex *Graham*, *Woodrow*; common in hedges, *Dalzell & Gibson*.—DISTRIB. India (W. Peninsula); Ceylon, Malay Peninsula.

12. **Solanum albicaule,** *Kotschy, ex Dunal, in DC. Prodr.* v. 13, part 1 (1852) p. 204. A very prickly undershrub; stem woody, 1 ft. and more high; branches elongate, terete, and, as well as the leaves beneath, petioles, peduncles, pedicels, calyx and corolla (outside) hoary with stellate tomentum; prickles numerous, compressed or sometimes conical, very sharp and recurved at the apex from a broad base, usually tomentose in the basal part. Leaves solitary or the upper twin, one of the pair shorter than the other, $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{5}{8}$–1 in., variable in shape, ovate-oblong or subpanduriform, acute or obtuse, entire or slightly lobate, softly hairy above, white with dense stellate tomentum beneath, base subcordate; main nerves 2–4 pairs; petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long, rarely prickly. Flowers in racemose cymes; peduncles short; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long, usually unarmed. Calyx densely woolly-tomentose, $\frac{1}{6}$–$\frac{1}{5}$ in. long, cyathiform; lobes equalling the tube, triangular, acute. Corolla purple, stellately pubescent outside; tube very short, $\frac{1}{16}$ in. long; lobes nearly $\frac{1}{2}$ in. long, lanceolate-oblong, acute, with a strong mid-nerve. Filaments very short, almost 0; anthers narrowly oblong-lanceolate, $\frac{1}{4}$ in. long, opening by small pores. Ovary glabrous; style glabrous, curved at the top. Berry $\frac{1}{6}$–$\frac{1}{4}$ in. in diam., globose, glabrous, yellow. Seeds $\frac{1}{8}$ in. in diam., subreniform, slightly tuberculate. *Solanum sindicum*, Prain, in Journ. Asiat. Soc. Beng. v. 65 (1896) p. 542.

Rare in the Bombay Presidency, occurring only in Sind. There is but one sheet in Herb. Kew., the specimens on which were collected by me near Karachi, in 1891.—DISTRIB. Arabia, Tropical Africa.

13. **Solanum gracilipes,** *Dcne. in Jacquem. Voy. Bot.* (1844) p. 113, t. 119. An undershrub with slender branches; stems stellately ashy-tomentose; branches terete, sparingly prickly; prickles small, sharp, straight or recurved, not compressed, tomentose at the base. Leaves small, rotund-ovate, obtuse, $\frac{3}{4}$–$1\frac{1}{2}$ in. long and nearly as broad as long, minutely stellately hairy on both sides, sometimes subglabrous, base subcordate, truncate, or cuneate; main nerves 3–4 pairs; petioles slender, $\frac{3}{4}$–$1\frac{1}{4}$ in. long, stellately tomentose, not prickly. Flowers in extra-axillary or subaxillary few-flowered fascicles sometimes reduced to a single flower; pedicels filiform, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, stellately tomentose, not prickly. Calyx $\frac{1}{6}$ in. long, stellately pubescent; lobes as long as the tube, linear from a triangular base and with a broad sinus between, elongating in fruit. Corolla $\frac{3}{8}$ in. long; lobes $\frac{1}{4}$ in. long, triangular-ovate, acute, stellately pubescent outside, reticulately veined. Filaments very short, almost 0; anthers $\frac{1}{4}$ in. long, linear-oblong, opening by small pores. Ovary globose-ovoid, glabrous or with a few stellate hairs at its apex; style glabrous. Berry $\frac{1}{4}$ in. in diam., globose, glabrous. Seeds $\frac{1}{8}$ in. in diam., minutely tuberculate. Fl. B. I. v. 4, p. 237; Aitch. Pb. &

Sind Pl. p. 102; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 6, part 3, p. 257.—Flowers: Dec.-Jan.

In the Bombay Presidency apparently confined to Sind. SIND: *Dalzell*, 77!, *Stocks*, 252!; near Karachi, *Bhola Puran*!, *Cooke*!, *Woodrow*; hills at the Hub, *Bhola Puran*, 119!; Mulir, *Woodrow*.—DISTRIB. India (Panjáb); Beluchistan.

Solanum torvum, Swartz, Prod. Descr. Veg. (1788) p. 47. A shrub 8–12 ft. high with a prickly stem and ovate sinuate or lobed leaves, stellately tomentose beneath without prickles. Though indigenous in some parts of India, being very common in Bengal, the plant is not indigenous and is rarely cultivated in the Bombay Presidency. Dalzell and Gibson (Bo. Fl. p. 175) mention its occurrence in the S. M. Country, but add that the plants were probably an escape from cultivation. Fl. B. I. v. 4, p. 234; Dalz. & Gibs. p. 175; Watt, Dict. Econ. Prod. v. 6, part 3, p. 264.—Flowers: July.

Solanum macrophyllum, Hort. ex Dunal, Hist. Solan. (1813) p. 199, t. 17. A large shrub, of short life, a native of Mexico, with large leaves more or less armed with prickles. The flowers when fresh are purple, changing to white, and much resemble the flowers of the potato. The plant is effective in gardens owing to its bold foliage and large flowers. Dalz. & Gibs. Suppl. p. 61.

Solanum tuberosum, Linn. Sp. Pl. (1753) p. 185. *The Potato*, introduced into Europe from America in the sixteenth century, is widely cultivated throughout India. The potatoes grown at Mahableshwar (4500 ft.) are noted for their excellence. An exhaustive account of the modes of cultivation adopted in different provinces of India will be found in Watt's 'Dictionary of Economic Products,' vol. 6, part 3, pp. 265-272. Fl. B. I. v. 4, p. 229; Grah. Cat. p. 137; Dalz. & Gibs. Suppl. p. 60; Woodr. Gard. in Ind. ed. 5, p. 397.—VERN. *Batáta*.

Solanum Melongena, Linn. Sp. Pl. (1753) p. 186. *The Brinjal* or *Egg-plant*, widely cultivated throughout India for its fruit. Its native country is uncertain, but it does not seem to have been found truly wild anywhere in India, though, as an escape, it is not uncommon. A full description of the plant and its varieties, mode of culture, &c. will be found in Watt's 'Dictionary of Economic Products,' v. 6, part 3, pp. 258–262. Fl. B. I. v. 4, p. 235; Grah. Cat. p. 138; Dalz. & Gibs. Suppl. p. 61; Woodr. Gard. in Ind. ed. 5, p. 399.—VERN. *Vángi*.

2. **PHYSALIS**, Linn.

Annual or perennial herbs. Leaves alternate, entire, sinuate or rarely pinnatifid. Flowers usually small, axillary, solitary, pedicellate. Calyx campanulate, 5-fid, much accrescent in fruit, then inflated, membranous, loosely enclosing the berry; teeth small, connivent. Corolla campanulate, greenish or lurid-yellow, sometimes with purple spots below. Stamens 5, attached near the base of the corolla; anthers usually shorter than the filaments, dehiscing longitudinally. Ovary 2-celled; ovules numerous; style filiform; stigma obscurely

2-lobed. Berry globose, enveloped in the bladder-like calyx. Seeds many or few, smooth or faintly tuberculate, compressed; embryo peripheric.—DISTRIB. Mostly American, several introduced in the Old World; species about 30.

1. **Physalis minima,** *Linn. Sp. Pl.* (1753) p. 183. Annual, herbaceous; stem erect, 6-12 in. high, striate, more or less (often viscidly) pubescent. Leaves 1–2½ by ½–1½ in., ovate, acute, shallowly toothed or lobed, more or less pubescent, thin, base cuneate; petioles ½–1¼ in. long, slender, more or less pubescent Flowers solitary; pedicels filiform, nodding, ⅛–⅓ in. long. Calyx ⅛–⅕ in. long at flowering-time, not angular, base truncate; teeth triangular, acute, nearly equalling the tube, ciliate. Corolla clear-yellow, sometimes spotted at the base within; lobes of limb very short. Filaments $\frac{1}{10}$ in. long, glabrous; anthers $\frac{1}{12}$ in. long, oblong, obtuse. Ovary ovoid, seated on a large disk; style glabrous. Berry ⅓ in. in diam., entirely enveloped in the enlarged calyx, which is ovoid or subglobose, ½–1 in. long, membranous, 5- or sometimes 10-ribbed, reticulately veined, tipped by the connivent pubescent calyx-teeth. Seeds discoid or subreniform, $\frac{1}{12}$ in. in diam., finely muriculate, orange-yellow. Fl. B. I. v. 4, p. 238; Grah. Cat. p. 140; Trim. Fl. Ceyl. v. 3, p. 236; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 6, part 1, p. 224.—Flowers: Aug. VERN. *Chirboti*; *Rán-popati.*

A weed, tolerably common in the Deccan. DECCAN: Poona, *Cooke!*, *Woodrow!* S. M. COUNTRY: Belgaum, *Ritchie*, 1305!—DISTRIB. More or less throughout India; Ceylon, Tropical Africa, and Australia.

Physalis peruviana Linn. Sp. Pl. ed. 2 (1763) p. 1670. A small shrub a native of Tropical America has been long grown in gardens and is known to Anglo-Indians as the *Cape Gooseberry.* The yellow berries are eaten, made into jam or used in tarts, and have a pleasant subacid flavor. It is sometimes found as an escape and used to be tolerably abundant below the Table Rock at Panchgani. Fl. B. I. v. 4, p. 238; Grah. Cat. p. 140; Dalz. & Gibs. Suppl. p. 61; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173 & Gard. in Ind. ed. 5, p. 400; Watt, Dict. Econ. Prod. v. 6, part 1, p. 225.—VERN. *Popati.*

3. **WITHANIA,** Pauq.

Unarmed shrubs, often hoary-tomentose. Leaves entire. Flowers usually fascicled, subsessile or shortly pedicellate, sometimes dicœcious. Calyx campanulate, 5–6-toothed, accrescent in fruit. Corolla campanulate; lobes 3–6, short, valvate in bud. Stamens 5, attached near the base of the corolla; anthers dehiscing longitudinally. Ovary 2-celled; ovules numerous; style linear; stigma shortly 2-fid. Berry globose, enclosed in the enlarged calyx. Seeds many, discoid; embryo peripheric. —DISTRIB. Southern Europe, Western Asia in warm regions, North Africa, Canary Islands; species 4.

Flowers hemaphrodite; berry loosely enclosed in the accrescent calyx	1. *W. somnifera.*
Flowers dicœcious; berry tightly girt by the accrescent calyx	2. *W. coagulans.*

1. **Withania somnifera,** *Dunal, in DC. Prod.* v. 13, part 1 (1852) p. 453. A branched erect undershrub 1–5 ft. high; branches terete, usually clothed with mealy stellate hoary tomentum. Leaves 2–4 by 1–2 in., ovate, subacute, entire, more or less minutely stellately pubescent, base acute; main nerves about 6 pairs, stout, conspicuous; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long, stellately tomentose. Flowers greenish or lurid-yellow, usually about 5 together in a sessile or nearly sessile umbellate cyme; pedicels 0–$\frac{1}{6}$ in. long. Calyx $\frac{1}{5}$ in. long in flower, stellately tomentose; teeth $\frac{1}{10}$ in. long, linear, acute, from a deltoid base. Corolla $\frac{1}{3}$ in. long, divided rather more than $\frac{1}{2}$-way down; lobes lanceolate, acute, pubescent outside. Filaments $\frac{1}{8}$ in. long, slender, glabrous; anthers broadly elliptic (almost orbicular), $\frac{1}{20}$ in. long. Ovary glabrous; style glabrous. Berry red, smooth, $\frac{1}{4}$ in. in diam., enclosed in the inflated calyx which reaches more than 1 in. in diam., and is globose, slightly 5-angled, pointed with the connivent calyx-teeth and scurfy-pubescent outside. Seeds $\frac{1}{10}$ in. in diam., yellow, somewhat scurfy. Fl. B. I. v. 4, p. 239; Aitch. Pb. & Sind Pl. p. 104; Trim. Fl. Ceyl. v. 3, p. 237; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 6, part 4, p. 311. *Physalis somnifera*, Linn. Sp. Pl. (1753) p. 182; Grah. Cat. p. 139; Dalz. & Gibs. p. 175; Wight, Icon. t. 853.—Flowers: Sept. VERN. *Ghodá*; *Askand.*

Not common except in Sind, where it is tolerably plentiful. KONKAN: *Graham.* DECCAN: Junnar, *Woodrow*; Poona, *Woodrow.* GUJARAT: *Graham.* SIND: *Stocks!*, *Cooke!*; Karachi, *Cooke!*, *Woodrow.*—DISTRIB. India in the drier regions; Ceylon, Mediterranean regions, Canaries, Cape of Good Hope.

2. **Withania coagulans,** *Dunal, in DC. Prodr.* v. 13, part 1 (1852) p. 685. A rigid grey-tomentose undershrub 1–3 ft. high; branches terete, clothed with dense grey or yellowish-white tomentum. Leaves 1–2$\frac{1}{4}$ by $\frac{3}{8}$–$\frac{7}{8}$ in., lanceolate-oblong, obtuse, entire, clothed with a persistent not easily-detachable greyish tomentum, of a uniform color on both sides, thick, more or less rugose, base acute, running down into an often obscure petiole; petioles $\frac{1}{4}$ in. long but often indistinct. Flowers diœcious, in axillary clusters; pedicels 0–$\frac{1}{4}$ in. long, deflexed, slender. Calyx $\frac{1}{4}$ in. long, campanulate, clothed with fine stellate grey tomentum; teeth triangular, $\frac{1}{10}$ in. long. Corolla $\frac{1}{3}$ in. long, stellately mealy outside, divided about $\frac{1}{3}$ the way down; lobes ovate-oblong, subacute. MALE FLOWERS: Stamens about level with the top of the corolla-tube; filaments $\frac{1}{12}$ in. long, glabrous; anthers $\frac{1}{8}$–$\frac{1}{6}$ in. long. Ovary ovoid, without style or stigma. FEMALE FLOWERS: Stamens scarcely reaching $\frac{1}{2}$-way up the corolla-tube; filaments about $\frac{1}{30}$ in. long; anthers smaller than in the male flowers, sterile. Ovary ovoid, glabrous; style glabrous; stigma mushroom-shaped, 2-lamellate. Berry $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., globose, smooth, closely girt by the enlarged membranous calyx which is scurfy-pubescent outside. Seeds $\frac{1}{10}$–$\frac{1}{8}$ in. in diam., somewhat ear-shaped, glabrous. Fl. B. I. v. 4, p. 240; Aitch. Pb. & Sind Pl. p. 104; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 6, part 6, p. 309. *Puneeria coagulans*, Stocks, in Journ. As. Soc. Bomb. v. 3 (1849) pp. 54–57; Wight, Icon. t. 1616; Hook. Icon. Pl. (1852) t. 801.—Flowers: Dec. VERN. *Panirband*; *Kaknaj.*

SIND: *Vicary!*, *Stocks*, 413!, *Dalzell*, 78!, *Woodrow*; Quetta Ghát, near Dirgi, *Cooke!*—DISTRIB. India (Panjáb, Sutlej Valley); Afghanistan, Beluchistan.

The fruit is commonly employed in Sind, N.W. India, Afghanistan, and Beluchistan as a substitute for rennet to coagulate milk. The seeds, which appear to contain the active ferment, have been the subject of important experiments by Mr. Lea, of which a full account will be found in Watt's Dict. Econ. Prod. l. c.

4. **LYCIUM,** Linn.

Spinous usually glabrous shrubs. Leaves small, alternate or often fascicled, linear, terete or flat. Pedicels usually solitary (rarely fascicled at the nodes); flowers small. Calyx campanulate, at first 5-merous, then irregularly 3–5-lobed or 2-lipped, in fruit not or scarcely enlarged. Corolla tubular-infundibuliform; lobes 5 (rarely 4), imbricate in bud, spreading in flower. Stamens 5 (rarely 4) on the corolla-tube; anthers exserted or included, dehiscing longitudinally. Ovary 2-celled; ovules few or many; style filiform; stigma subcapitate. Berry small, globose or oblong. Seeds many, few, or solitary, compressed, scrobiculate; embryo peripheric.—Distrib. Temperate and subtropical regions of the world, especially S. Africa and S. America; species 40.

1. **Lycium barbarum,** *Linn. Sp. Pl.* (1753) p. 192. A spinous shrub reaching 10 ft. high; branches white or grey, armed with sharp conical spines which sometimes elongate and bear leaves and flowers. Leaves very variable, sometimes solitary, oblong-lanceolate, reaching 1¾-by ¼ in., more commonly in fascicles and oblong-spathulate or linear, obtuse, attenuated into a short petiole, glabrous or nearly so. Flowers solitary or in fascicles of 2–5; pedicels filiform, ¼–½ in. long. Calyx in flower glabrous, somewhat rugose outside, ⅙ in. long, cyathiform, often becoming irregularly lobed and sometimes 2-lipped in fruit; teeth 4–6, oblong, obtuse, about $\frac{1}{30}$ in. long, with membranous margins. Corolla ⅜-½ in. long, glabrous; lobes $\frac{1}{10}$–⅙ in. long, oblong, obtuse. Stamens exserted beyond the corolla-tube; filaments flat, glabrous at the base; anthers $\frac{1}{20}$ in. long, orbicular. Ovary ovoid-oblong, glabrous, seated in a large membranous cup-shaped disk; style glabrous, exserted beyond the corolla-tube; stigma mushroom-headed, 2-lamellate. Berry bright-red, ¼ in. in diam., seated on the slightly enlarged and often deformed calyx. Seeds $\frac{1}{10}$ in. in diam., discoid or subreniform, embedded in a soft glutinous viscid pulp, very minutely pitted, orange-yellow. Fl. B. I. v. 4, p. 241; Bois. Fl. Orient. v. 4, p. 289; Talb. Trees, Bomb. ed. 2, p. 254; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173. *Lycium foliosum* & *L. depressum*, Stocks, in Kew Journ. Bot. v. 4 (1852) p. 179.—Flowers: Nov.

A variable plant as regards arrangement, size, and shape of leaves, length of corolla, and relative lengths of corolla-tube and lobes. It seems to be hardly separable from *Lycium europæum*, Linn.

Gujarat: Porbandar (Kathiawar), *Cooke*! Sind: *Stocks*; Landhi, near Karachi, *Cooke*!—Distrib. India (Panjáb); Beluchistan, Afghanistan, Persia.

5. **DATURA,** Linn.

Herbs or shrubs glabrous or minutely pubescent. Leaves large, entire or coarsely sinuate-dentate. Pedicels solitary. Flowers large, purple or white, erect or pendulous. Calyx long-tubular, herbaceous, 5-toothed; in fruit circumscissile above the base, the upper part deciduous. Corolla

long, tubular-infundibuliform; mouth wide; limb plicate, entire or shortly 5-10-lobed, the lobes often acuminate. Stamens attached near the base of the tube, included; filaments filiform; anthers linear, longitudinally dehiscent. Ovary 2- or spuriously 4-celled; ovules numerous; style filiform; stigma 2-lobed. Capsule ellipsoid, 4-celled, usually spinous, 4-valved or irregularly breaking up near the apex. Seeds very many, compressed; embryo peripheric.—DISTRIB. Temperate and tropical regions; species 10 or 12.

1. **Datura fastuosa,** *Linn. Syst. Nat.* ed. 10 (1759) p. 932. Annual; stem stout, 1–2 ft. high, somewhat zigzag, rather succulent, softly pubescent, divaricately branched. Leaves 3–6 by 1¼–3 in., ovate, acute, entire or with a few large teeth or lobes, usually covered with a fine mealy pubescence (sometimes nearly glabrous), glaucous-green above, paler beneath, usually rounded and very unequal at the base; main nerves conspicuous, usually about 8 on one side of the midrib, 6 at the other; petioles 1–2 in. long. Flowers purple outside, usually white inside, often double, solitary; pedicels short, stout, pubescent. Calyx reaching sometimes 3½ in. long, finely pubescent; teeth ½–¾ in. long, triangular, very acute. Corolla 7 in. long or even more, often 4–5 in. across at the mouth; limb with 5 or 6 short acute deltoid lobes and a short tail in the middle of each intervening sinus. Stamens about equalling the corolla-tube; filaments slender; anthers ⅜ in. long, oblong, obtuse. Ovary clothed with soft prickles; stigma 2-lobed. Capsules nodding, on curved pedicels 1¼ in. in diam., subglobose, supported on the reflexed base of the calyx, green, covered all over with numerous straight sharp prickles. Seeds numerous, closely packed, compressed, ⅛ in. in diam., nearly smooth, yellowish-brown. Fl. B. I. v. 4, p. 242; Grah. Cat. p. 141; Wight, Icon. t. 1396; Trim. Fl. Ceyl. v. 3, p. 238; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 473; Watt, Dict. Econ. Prod. v. 3, p. 32. *Datura Hummatu*, Bernh. in Tromms. N. Journ. Pharm. v. 26 (1833) p. 153; Dalz. & Gibs. p. 174.—Flowers: Sept.–Dec. VERN. *Kálá-dhatura.*

Very common on rubbish heaps throughout the Presidency.

VAR. *alba*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1883) p. 243. Flowers white or cream-colored, rather smaller than those of *D. fastuosa* proper, single, not double as is often the case in that plant. Watt, Dict. Econ. Prod. v. 3, p. 36. *Datura alba* (sp.), Nees, in Trans. Linn. Soc. v. 17 (1834) p. 73; Wight, Icon. t. 852; Grah. Cat. p. 141; Dalz. & Gibs. p. 174.—Flowers: Sept.–Dec. VERN. *Dhatura.*

Found in the same localities as the preceding, than which it is even more common. The seeds of both are highly poisonous, the natives being of opinion that those of the purple-flowered plant (*kā'á-dhatura*) are the more deadly of the two. They are used by roadside poisoners to stupify their victims and render the committal of theft easy. They are also used to render liquor more intoxicating and as a remedy for hydrophobia. For a full account see Watt, Dict. Econ. Prod. l. c.

Datura Metel, Linn. Sp. Pl. (1753) p. 179. A native (probably) of Tropical America has been occasionally found, no doubt as an escape. It has (*e. g.*) been found on a small island in the river at Poona. The

limb of the corolla is 10-toothed and the capsules nodding. Fl. B. I. v. 4, p. 243; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 3, p. 39.

Datura arborea, Linn. Sp. Pl. (1753) p. 179. A large shrub with pure white flowers 7 or 8 inches long and about 4 inches wide at the mouth. It is easily propagated and thrives well at about 4000 ft. altitude. It is abundant at Mahableshwar, where it has been planted along many of the new roads, and its large trumpet-like flowers are conspicuous objects. It is a native of Peru. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173 & Gard. in Ind. ed. 5, p. 401. *Brugmansia candida*, Pers. Syn. v. 1, p. 216; Grah. Cat. p. 141; Dalz. & Gibs. Suppl. p. 63.

6. **HYOSCYAMUS,** Linn.

Erect coarse herbs. Leaves sinuate-dentate or pinnatifid, rarely quite entire. Flowers usually unilateral, sessile or pedicellate, the lower axillary, solitary, the upper arranged in a spike or scorpioid raceme; upper floral leaves bract-like. Calyx tubular-campanulate or urceolate, shortly 5-fid, enlarged in fruit, including the capsule, strongly ribbed. Corolla infundibuliform; limb oblique, 5-fid; lobes more or less unequal, imbricate in bud. Stamens attached about the middle of the corolla-tube, usually exserted; anthers dehiscing longitudinally. Ovary 2-celled; ovules numerous; style filiform; stigma subcapitate. Capsule perfectly or almost perfectly 2-celled, circumscissile above the middle. Seeds more or less compressed, usually scrobiculate; embryo peripheric.—Distrib. Mediterranean region, Canary Islands and thence to Central Asia; species 8 or 9.

1. **Hyoscyamus muticus,** *Linn. Mant.* (1767) p. 45. Herbaceous, 1–3 ft. high; root creeping extensively (*Stocks*); stem branched, erect, firm, fistulose, leafy, obsoletely angular; branches clothed with soft clammy woolly hairs. Cauline leaves scattered, 4–8 by 2–5 in., the lower the largest, ovate-oblong or subrhomboid, acute, thick, entire or coarsely sinuate-dentate, pubescent or woolly, base acute; petioles $\frac{1}{2}$–3 in. long, very broad. Flowers unilateral in 10–30-flowered spicate racemes, scorpioid when young, much elongate (6–12 in.) in age; pedicels of the lower flowers sometimes nearly as long as the calyx, those of the uppermost flowers scarcely $\frac{1}{10}$ in. long. Calyx strongly nerved, urceolate, $\frac{2}{3}$–1 in. long in flower, enlarged in fruit; teeth triangular-oblong, acute, not spreading, often unequal. Corolla infundibuliform, 1–1$\frac{1}{2}$ in. long; tube gradually enlarged into the limb, about equalling the calyx, greenish; limb pink outside, darker pink inside, veined, often with dark purple spots at the base; lobes short, suborbicular, subequal. Stamens unequal, the 3 lower shorter, about equalling the corolla, the 2 upper longer than the corolla; filaments pubescent at the base; anthers $\frac{1}{6}$ in. long, sagittate at the base. Ovary glabrous or faintly pubescent; style longer than the stamens, glabrous. Capsules $\frac{3}{8}$ by $\frac{1}{4}$ in., oblong, rounded at the apex, circumscissile near the top. Seeds very numerous, $\frac{1}{4}$ in. in diam., discoid, tuberculate, yellow. Fl. B. I. v. 4, p. 245; Jaub. & Spach, Ill. Pl. Or. v. 5, t. 415; Woodr. in Journ. Bomb. Nat. v. 12

(1898) p. 173. *Hyoscyamus insanus*, Stocks, in Kew. Journ. Bot. v. 4 (1852) p. 178.

Rare in the Presidency, found only on the Sind hills. SIND: Boogta hills, *Vicary*!; Sind hills, *Dalzell*!; Kirthar mountains, *Woodrow*.—Flowers: Mar.

Stocks in Kew Journ. l. c. gives an account of the effects of smoking the plant in small quantities, which are said to be the production of furious delirium.—DISTRIB. India (Panjáb); Afghanistan, Beluchistan, Egypt.

Hyoscyamus niger, Linn. Sp. Pl. (1753) p. 179. *The Henbane*, a native of Europe and the temperate Himalaya, was for a long time successfully cultivated at Hewra by Dr. Gibson and at Dapuri near Poona by Dr. Lush for the supply of the extract to the Bombay Government Medical Stores. Its cultivation for this purpose has been discontinued. Very high manuring was necessary to produce leaves in quantity. Fl. B. I. v. 4, p. 244; Grah. Cat. p. 141; Dalz. & Gibs. Suppl. p. 62; Woodr. Gard. in Ind. ed. 5, p. 401; Watt, Dict. Econ. Prod. v. 4, p. 319.

The following species not belonging to any of the foregoing genera are more or less cultivated as economic or ornamental plants in the Bombay Presidency:—

Lycopersicum esculentum, Mill. Gard. Dict. ed. 8 (1768) n. 2. *The Tomato*, a native of Tropical America, cultivated extensively and sometimes found as an escape throughout India, too well known to need description. Fl. B. I. v. 4, p. 237; Grah. Cat. p. 139; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173 & Gard. in Ind. ed. 5, p. 398; Watt, Dict. Econ. Prod. v. 5, p. 100.—VERN. *Vel-vángi*.

Cyphomandra betacea, Sendt. in Flora, v. 28 (1845) p. 172. A shrub cultivated in S. America for its fruit, which somewhat resembles a Tomato in general appearance. It was expected to thrive in the Deccan, but has hitherto been unable to resist the S.W. Monsoon (*Woodrow*). On the hills it has succeeded fairly well. The fruit is used in tarts. Woodr. Gard. in Ind. ed. 5, p. 401.

Nicandra physaloides, Gærtn. Fruct. v. 2 (1791) p. 237, t. 131, fig. 2. A much-branched glabrous annual with pretty bluish-purple bell-shaped flowers, a native of Peru, cultivated and sometimes found as an escape (especially about Dapuri near the site of the old Botanic Garden). Fl. B. I. v. 4, p. 240; Grah. Cat. p. 140; Dalz. & Gibs. Suppl. p. 62; Bot. Mag. (1824) t. 2458; Watt, Dict. Econ. Prod. v. 5, p. 350.—VERN. *Rán-popati*.

Cestrum elegans, Schlech. in Linnæa, v. 19 (1847) p. 261. A branched shrub 4–6 ft. high, with ovate-lanceolate leaves and dense cymes of purplish-red flowers at the ends of the branches. It flowers from September to December and is easily propagated by cuttings. Woodr. Gard. in Ind. ed. 5, p. 402.

Cestrum aurantiacum, Lindl. Bot. Reg. (1844) Misc. p. 71. A large shrub, a native of Guatemala, with smooth wavy light-green glossy leaves and spikes of glowing orange-colored, somewhat waxy flowers

about 1 in. long, produced in profusion in December. Woodr. Gard. in Ind. ed. 5, p. 402.

Nicotiana Tabacum, Linn. Sp. Pl. (1753) p. 180. The well-known *Tobacco Plant*, grown more or less throughout India, and, in the Bombay Presidency, largely throughout the Deccan and Gujarat. Its native country is not known with absolute certainty, but it is generally supposed to be a native of S. America. It does not exhibit much tendency to spread as a weed (*Clarke*). Fl. B. I. v. 4, p. 245; Grah. Cat. p. 140; Dalz. & Gibs. Suppl. p. 62; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 5, p. 353.

Browallia demissa, Linn. Syst. ed. 10 (1759) p. 1118. A pretty annual about 1½ ft. high, a native of S. America, with ovate acute leaves and numerous small blue flowers about ½ in. across when expanded. Dalz. & Gibs. Suppl. p. 63. *Browallia elata*, Linn. l. c.; Woodr. Gard. in Ind. ed. 5, p. 404 A.

Brunsfelsia americana, Linn. Sp. Pl. (1753) p. 191. A free-flowering shrub, a native of Tropical America, with elliptic-ovate leaves and odorous flowers with a long corolla-tube. The flowers are at first yellow, afterwards turning white. Woodr. Gard. in Ind. ed. 5, p. 402; Firminger, Man. Gard. ed. 3 (1874) p. 551.

Petunia. Varieties of *Petunia nyctaginiflora*, Juss. in Ann. Mus. Par. v. 2 (1803) p. 216, t. 47, fig. 2, and of *Petunia violacea*, Lindl. Bot. Reg. t. 1626, natives of the Argentine, are grown in gardens, where they make an imposing show with their variously striped and colored corollas. Dalz. & Gibs. Suppl. p. 63; Woodr. Gard. in Ind. ed. 5, pp. 402–403.

Capsicum.

There seems little doubt that the several varieties of this genus are natives of Tropical America, although they have been cultivated in India from a remote period. Numerous species (perhaps 50 or more) have been enumerated by various authors, but, at present, botanists have generally agreed to refer all the varieties to 2 species, and to consider the other so-called species to be varieties or subvarieties of these. The two accepted species of the genus are *Capsicum annuum*, Linn., and *C. frutescens*, Linn.

Capsicum annuum, Linn. Hort. Cliff. (1737) p. 59. Herbaceous or suffrutescent, annual or biennial, usually 2–3 ft. (sometimes 4–5 ft., rarely only 1 ft.) high. Pedicels usually solitary. Corolla usually white (in var. *longum*, purple). This species furnishes the chief commercial varieties now in cultivation. Linn. Sp. Pl. (1753) p. 188; Fingerh. Monogr. Gen. Caps. (1832) p. 12, t. 2, fig. *a*; Irish, Revis. Gen. Caps. in Missouri Bot. Gard. Rep. 9 (1898) p. 65; Watt, Dict. Econ. Prod. v. 2, p. 134.

VAR. *acuminatâ*, Fingerh. Monogr. Gen. Caps. (1832) p. 13, t. 2, fig. *c*. Plant 1½–2½ ft. high. Foliage dense. Leaves solitary, sometimes semi-fascicled, ovate, acuminate. Pedicels slender, enlarging towards the apex. Calyx embracing the base of the

fruit. Corolla dull-white. Fruit tapering, much longer than broad, usually more or less curved, red, yellow or orange; flesh thin, pungent. Irish, Rev. Caps. in Missouri Bot. Gard. Rep. 9 (1898) p. 69, t. 10. *Capsicum frutescens*, Roxb. Fl. Ind. v. 1, p. 574 (*not* of Linn.); Grah. Cat. p. 139; Dalz. & Gibs. Suppl. p. 61; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 2, p. 137. The common *Chilli* largely cultivated.—VERN. *Mirchi*; *Lál mirchi*.

VAR. *abbreviata*, Fingerh. Monogr. Gen. Caps. (1832) p. 14, t. 2, fig. *f*. Plant 1–2 ft. high; branches numerous, more or less angled. Leaves broadly ovate. Pedicels 1–1½ in. long, usually solitary. Berry seated on the calyx, not enclosed by it at the base. Corolla dull-white. Fruit not or but little longer than broad, circular in cross-section, usually subconical, ovoid or ellipsoid, more or less rugose, red or yellow when ripe, often variously blotched with brown before ripening; flesh thin, pungent. Irish, Revis. Gen. Caps. in Missouri Bot. Gard. Rep. 9 (1898) p. 88, t. 28. *Capsicum annuum*, Roxb. Fl. Ind. v. 1, p. 573. Cultivated sparingly, chiefly in the gardens of Europeans.

VAR. *grossa*, Sendt. in Mart. Fl. Bras. v. 10 (1846–1856) p. 147. *Plant herbaceous, 1½–2 ft. high; branches green, often warty, enlarged at the nodes which are often blotched with purple. Leaves thick, the lower ones very large, on stout petioles 2–3 in. long. Pedicels stout, ¾–1 in. long. Calyx not embracing the base of the fruit. Corolla large, spreading, dull-white. Fruit large, angular in cross-section, prismatic, quadrate, or oblate, more or less sulcate, usually with a basal depression; flesh thick, scarcely at all pungent. Irish, Revis. Gen. Caps. in Missouri Bot. Gard. Rep. 9 (1898) p. 80, tt. 15–24. *Capsicum grossum* (sp.), Linn. Mantiss. (1767) p. 47; Grah. Cat. p. 139; Dalz. & Gibs. Suppl. p. 61; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 2, p. 139. *C. ceratocarpum*, Fingerh. Monogr. Gen. Caps. (1832) p. 22, t. 6, fig. *c*. *Spanish or Monstrous Pepper*, grown sparingly, chiefly in the gardens of Europeans.—VERN. *Kafri-mirchi*; *Bopala-mirchi*.

VAR. *cerasiformis*, Mill. Gard. Dict. ed. Martyn (1807) n. 1, *e*. Shrubby, 1–2 ft. high; branches numerous, 4-angled, green or purplish, usually purple and much enlarged at the nodes. Leaves ovate or oblong, acuminate. Pedicels ⅜–½ in. long, usually solitary. Calyx not embracing the base of the fruit. Corolla large, dull-white. Fruit spherical, subcordate, ½–1 in. in diam., often, when unripe, blotched with purple on the side next the sun; flesh firm, thick, extremely pungent. Irish, Revis. Gen. Caps. in Missouri Bot. Gard. Rep. 9 (1898) p. 92. *Capsicum cerasiforme* (sp.), Mill. Gard. Dict. ed. 6 (1752) n. 5; Fingerh. Monogr. Gen. Caps. (1832) p. 19, t. 5, fig. *b*. *C. grossum* var. *cerasiformis*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 239.

Cherry Pepper, cultivated occasionally in the gardens of Europeans.

VAR. *longum*, Sendt. in Mart. Fl. Bras. v. 10 (1846–1856) p. 147. Branches few, large, erect, green, often streaked with purple and with purplish nodes. Leaves ovate, acuminate, with long petioles. Pedicels solitary, $\frac{7}{8}$–$1\frac{1}{8}$ in. long, curved or straight. Calyx hardly embracing the base of the fruit. Corolla purple, or white blotched with purple. Fruit tapering, much longer than broad, nearly black at first, afterwards becoming orange-red; flesh rather thick, usually mild in flavour. Irish, Revis. Gen. Caps. in Missouri Bot. Gard. Rep. 9 (1898) p. 73, t. 12, fig. 2. *Capsicum purpureum*, Vahl, ex Hornem. Hort. Hafn. v. 1 (1813) p. 224; Roxb. Fl. Ind. v. 1, p. 573. *C. nigrum*, Willd. Enum. (1809) p. 242. *C. annuum* var. *nigra*, Prain, Beng. Pl. (1903) p. 749. *Purple Chilli*, occasionally cultivated in gardens.

Capsicum frutescens, Linn. Hort. Cliff. (1737) p. 60. Shrubby perennial plants $2\frac{1}{2}$–6 ft. high; branches angular. Leaves broadly ovate, acuminate, usually wrinkled, more or less pubescent. Pedicels slender, usually 2 or more together, 1–2 in. long. Calyx embracing the base of the fruit, usually cup-shaped. Corolla white or greenish-white, often with ochreous markings in the throat. Fruit red, ovoid, obtuse, or oblong, acuminate. Linn. Sp. Pl. (1753) p. 159; Fingerh. Monogr. Gen. Caps. (1832) p. 17, t. 4, fig. *c*; Irish, Revis. Gen. Caps. in Missouri Bot. Gard. Rep. 9 (1898) p. 97, t. 9, fig. 1. *Capsicum minimum*, Mill. Gard. Dict. ed. 6 (1752) n. 10; Roxb. Hort. Beng. (1814) p. 17; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173; Watt, Dict. Econ. Prod. v. 2, p. 139. The *Bird's-eye Chilli* of Europeans, cultivated, but not extensively, often found as an escape.—VERN. *Lovungi-mirchi*.

VAR. *baccata*, Irish, Revis. Gen. Caps. in Missouri Bot. Gard. Rep. 9 (1898) p. 99. A much-branched shrub. Leaves ovate, acuminate, narrowing abruptly into the petiole. Pedicels usually 2 together, slender, 1–$1\frac{1}{4}$ in. long, extra-axillary, erect. Calyx short, not embracing the base of the fruit. Corolla small, greenish-white. Fruit globose or nearly so, about $\frac{1}{4}$ in. in diam., changing from green to blackish-spotted, finally ripening to a red or yellow. *Capsicum baccatum* (sp.), Linn. Mantiss. (1767) p. 47; Fingerh. Monogr. Gen. Caps. (1832) p. 18, t. 4, fig. *a*; Sendt. in Mart. Fl. Bras. v. 10 (1846–1856) p. 146. *C. minimum*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 239 in part. The *Brazil Pepper* or *Pimentas*, occasionally cultivated.

ORDER XC. SCROPHULARIACEÆ.

Herbs or shrubs (rarely trees), often semi-parasitic, rarely quite parasitic on roots. Leaves all or the lower only opposite, rarely all alternate or whorled; stipules 0. Flowers hermaphrodite, usually irregular; inflorescence centripetal or composite. Calyx inferior, usually persistent, 5 (rarely 4) -merous. Corolla hypogynous, more or less 2-lipped or occasionally personate, 4–5-lobed. Stamens usually 4

with or without a rudimentary 5th (*staminode*), less commonly 2 or 5; anthers variously shaped, 1-2-celled, the cells distinct or more or less confluent. Disk annular, cupular, or glandular. Ovary superior, usually 2-celled; ovules many, rarely few or only 2 in each cell, anatropous or amphitropous; style simple; stigma capitate, or dilated, or 2-lobed, or 2-lamellate. Fruit capsular (rarely baccate); placentas on a free central axis or attached to the margins of the valves. Seeds small, of various shapes; hilum lateral or ventral; albumen fleshy (rarely 0); embryo straight or curved.—DISTRIB. Throughout the world; genera about 160; species about 2000.

Leaves all alternate.
- Corolla-tube elongate.
  - Stamens 2. Viscid herbs ..... 1. ANTICHARIS.
- Corolla subrotate.
  - Stamens 4, didynamous ..... 2. CELSIA.

Leaves the lower at least if not all opposite.
- Corolla spurred or subsaccate at the base in front; capsule opening by pores.
  - Corolla spurred; anther-cells distinct ..... 3. LINARIA.
  - Corolla subsaccate; anther-cells confluent above ..... 4. SCHWEINFURTHIA.
- Corolla not spurred nor subsaccate; capsule dehiscing by valves.
  - Corolla with upper lip or 2 upper lobes outermost, and lower lobes innermost in bud.
    - Corolla elongate; tube cylindric with more or less expanded throat; limb with subequal lobes or 2-lipped; stamens 4 or 2.
      - Stamens 4, inserted within the corolla-tube.
        - Corolla-lobes rounded, subequal.
          - Anther-cells divaricate, confluent; capsule septicidal ..... 5. SUTERA.
          - Anther-cells contiguous though distinct, parallel; capsule septicidal and loculicidal ..... 6. MONIERA.
        - Corolla distinctly 2-lipped.
          - Corolla with 2-gibbous throat; anther-cells confluent at the apex ... 7. MIMULUS.
          - Corolla-throat not 2-gibbous; anther-cells distinct.
            - Placentas either separating in fruit or, if conjoined in a column, the column not winged; seeds terete ..... 8. STEMODIA.
            - Placentas always conjoined in a column which is winged by the remains of the septa; seeds angular, usually truncate ..... 9. LIMNOPHILA.
      - Stamens 2 perfect, the lower pair reduced to staminodes, all inserted in the corolla-tube ..... 10. DOPATRIUM.
      - Stamens if 4 the lower pair, if 2 the staminodes inserted in the corolla-throat, the upper or only perfect pair inserted in the corolla-tube; capsule septicidal.
        - Stamens 4 with perfect anthers.
          - Calyx-segments winged.
            - Calyx 3–5-toothed or 2-lipped . 11. TORENIA.
          - Calyx-segments not winged.
            - Long filaments with a broad appendage at the base; calyx 5-partite ..... 12. ARTANEMA.

Long filaments with a tooth-like or subulate appendage at the base; calyx 5-fid or 5-partite ..... 13. VANDELLIA.
Stamens 2 with perfect anthers, the 2 lower reduced to staminodes inserted on the corolla-throat.
Leaves with parallel nerves; staminodes unequally 2-lobed ..... 14. ILYSANTHES.
Leaves penni-nerved; staminodes entire..... 15. BONNAYA.
Corolla small; tube very short; stamens 2. Prostrate or creeping herbs.
Calyx tubular, obtusely 5-toothed ..... 16. PEPLIDIUM.
Calyx campanulate, 3–4-lobed ..... 17. GLOSSOSTIGMA.
Corolla-lobes all flat, the 2 lateral or one of them exterior in bud; stamens 2.
Shrubs with alternate linear fleshy leaves..... 18. CAMPYLANTHUS.
Herbs; corolla subrotate; tube short ..... 19. VERONICA.
Corolla with upper lip or 2 upper lobes innermost and lower lobes outermost in bud; stamens 4.
Calyx tubular, 5-toothed or 5-fid.
Corolla-tube straight or nearly so; lobes subequal; lower leaves much larger than the upper ..... 20. BUCHNERA.
Corolla-tube abruptly incurved at or above the middle; 2 upper lobes smaller than the others; lower leaves not much larger than the upper ..... 21. STRIGA.
Calyx campanulate, 5-fid or 5-lobed.
Anthers 1-celled; leaves sometimes pinnatisect; corolla-tube long, slender ..... 22. RHAMPHICARPA.
Anthers 2-celled, one of the cells barren; leaves always pinnatisect; corolla-tube short with dilated throat ..... 23. SOPUBIA.
Anthers 2-celled, both cells fertile; leaves toothed, not pinnatisect ..... 24. LINDENBERGIA.
Calyx spathaceous, split down the front.
Corolla-lobes subequal, broad, spreading; anthers 2-celled, one cell often empty ..... 25. CENTRANTHERA.
Corolla strongly 2-lipped, the upper lip erect, hooded; anther-cells both fertile ..... 26. PEDICULARIS.

1. **ANTICHARIS,** Endl.

Small erect viscid-hairy herbs. Leaves alternate, quite entire. Flowers axillary, usually solitary, with 2 bracts on the pedicel. Calyx 5-partite; sepals narrow, subvalvate. Corolla-tube enlarged at the throat; lobes 5, subequal. Stamens 2 perfect; filaments filiform; anthers versatile, curved; staminodes 0. Style filiform; stigma obtuse or notched. Capsule ovoid or oblong, acuminate, loculicidally and septicidally dehiscent; valves with inflexed margins, separating from the axis, laying bare the placentiferous column. Seeds numerous, small, oblong or obovoid, striately ribbed; embryo straight; cotyledons ovate.—DISTRIB. Tropical and South Africa, Arabia, India; species about 9.

Leaves ovate, not exceeding ¾ in. long; pedicels less than twice as long as the calyx ..... 1. *A. glandulosa.*
Leaves narrowly linear, exceeding 1 in. long; pedicels more than twice as long as the calyx ..... 2. *A. linearis.*

1. **Anticharis glandulosa,** *Aschers. in Monatsb. Akad. Wiss. Berl.* (1866) p. 880. An erect branched leafy herb scarcely reaching 1 ft. high, clothed all over with viscid glandular hairs. Leaves $\frac{3}{8}$–$\frac{3}{4}$ in. long, ovate-oblong, subobtuse, densely glandular-hairy, entire, narrowed into a short flattened often obscure petiole. Pedicels axillary, solitary (very rarely 2 together), $\frac{1}{3}$ in. long, slender, glandular-hairy; bracts 2 about the middle of the pedicel, reaching $\frac{1}{4}$ in. long, linear-spathulate, glandular hairy. Calyx $\frac{1}{4}$ in. long, divided to the base; sepals oblanceolate, acute, glandular-hairy and ciliate. Corolla scarcely $\frac{1}{2}$ in. long, rosy. Filaments short, filiform, glabrous; anthers versatile, curved, the segments unequal. Ovary ovoid, glabrous, seated on a somewhat cup-shaped disk; style glabrous. Capsules $\frac{1}{3}$ in. long, narrowly ovoid, acuminate, pubescent. Seeds about $\frac{1}{25}$ in. long, oblong, truncate, longitudinally striately ribbed. Fl. B. I. v. 4, p. 249; Boiss. Fl. Orient. v. 4, p. 423; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173. *Anticharis arabica,* Aitch. Pb. & Sind Pl. p. 106 (*not* of Endl.).

In the Bombay Presidency confined to Sind. SIND: *Stocks*!, *Vicary*!, *Bhola Puran*!, *Cooke*!, *Woodrow*.—DISTRIB. Upper Egypt.

2. **Anticharis linearis,** *Hochst. ex Aschers. in Monatsb. Akad. Wiss. Berl.* (1866) p. 882. A much-branched herb rarely exceeding 1 ft. high, turning black in drying, more or less clothed with slender glandular hairs. Leaves linear, acute, 1–1$\frac{3}{4}$ by $\frac{1}{12}$–$\frac{1}{8}$ in., sessile, entire, glandular-hairy or nearly glabrous. Pedicels $\frac{1}{2}$–$\frac{3}{4}$ in. long, solitary, filiform, with 2 small linear bracts $\frac{1}{10}$–$\frac{1}{8}$ in. long at or near the middle. Calyx $\frac{1}{5}$ in. long, divided to the base; sepals linear-lanceolate, acute, glandular-hairy. Corolla pale-purple, veined, divided scarcely $\frac{1}{4}$-way down; lobes 5, oblong, obtuse. Anthers versatile, curved, the segments unequal. Style glabrous. Capsules $\frac{1}{3}$ in. long, ovoid, acuminate, pubescent, veined. Seeds $\frac{1}{30}$ in. long, oblong, truncate, longitudinally striately ribbed. Boiss. Fl. Orient. v. 4, p. 423; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 173. *Doratanthera linearis,* Benth. in DC. Prodr. v. 10 (1846) p. 347; Aitch. Pb. & Sind Pl. p. 106.

In the Bombay Presidency confined to Sind. SIND: *Stocks*!, *Woodrow*, *Bhola Puran*!—DISTRIB. India (Panjáb); Arabia, Tropical Africa, Cape de Verde Islands.

2. CELSIA, Linn.

Annual or biennial erect herbs. Leaves alternate, crenate, sinuate-dentate or inciso-pinnatifid. Flowers in terminal simple or rarely branched spikes or racemes. Calyx deeply 5-fid or 5-partite; segments imbricate. Corolla rotate; tube scarcely any; lobes 5, broad, somewhat unequal, the upper outermost in bud. Stamens 4, didynamous or (in the single Bombay species) subequal; filaments bearded; anthers at the apex of the filament transverse or oblique, the cells confluent; staminodes 0. Ovary 2-celled; ovules many; style entire; stigma compressed, terminal. Capsule globose or ovoid, septicidally 2-valved, the valves each usually 2-fid. Seeds small, warted, not winged.—DISTRIB. S. Europe, N. Africa, Abyssinia, W. Asia, and East Indies; species about 30.

1. **Celsia coromandeliana,** *Vahl, Symb. Bot.* v. 3 (1794) p. 79. An annual herb; stem 2–3 ft. high, hairy, often branched near the top.

Leaves: radical 2-4 by ¾–1½ in., on long petioles, lyrate, compound or pinnatisect, with several small leaflets or segments at the base and a large ovate-oblong subacute terminal lobe; lower cauline leaves similar but smaller, and with shorter petioles; upper cauline leaves gradually becoming smaller and sessile, passing into bracts, all coarsely dentate, more or less hairy on both sides. Flowers yellow, in simple or branched terminal racemes 1–2 ft. long; rhachis glandular-pubescent; pedicels longer than the calyx, glandular-pubescent; bracts (or floral leaves) foliaceous, ovate, acute, sessile, gradually becoming smaller upwards. Calyx rather less than ¼ in. long, deeply divided, glandular-pubescent; lobes ⅛ in. long, linear-oblong, subacute. Corolla rotate, ½ in. in diam.; lobes 5, rounded. Filaments densely bearded with purple hairs. Ovary globose, glabrous; style glabrous. Capsules ¼–⅓ in. in diam., subglobose. Seeds $\frac{1}{50}$ in. long, oblong, truncate, warted. Fl. B. I. v. 4, p. 251; Dalz. & Gibs. p. 176; Wight, Icon. t. 1406; Aitch. Pb. & Sind Pl. p. 105; Trim. Fl. Ceyl. v. 3, p. 240; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174; Watt, Dict. Econ. Prod. v. 2, p. 241. *Celsia Arcturus*, Grah. Cat. p. 141 (*not* of Jacq.).—Flowers: Jan.–May. VERN. *Kutaki.*

KONKAN: *Law!* DECCAN: waste places, *Dalzell & Gibson*; Poona, *Cooke!*, *Woodrow!*; Raighar Fort, *Dalzell & Gibson.* GUJARAT: *Woodrow.* SIND: *Stocks!*—DISTRIB. Throughout India; Ceylon, Afghanistan, Ava, China.

The plant has some repute in native medicine. See Watt, Dict. Econ. Prod. l.c.

3. **LINARIA,** Juss.

Herbs. Leaves usually opposite or whorled below and alternate above. Flowers axillary, solitary, or the upper arranged in a terminal raceme or spike, the floral leaves reduced to bracts; pedicels slender; bracteoles 0. Calyx 5-partite; segments imbricate. Corolla personate, 2-lipped; tube spurred in front; upper lip erect, 2-lobed; lower lip spreading, 3-lobed; throat usually closed by the tumid palate. Stamens 4, didynamous, included, ascending; anthers with distinct parallel cells. Ovary 2-celled; ovules many; style filiform; stigma minute. Capsule ovoid or globose, 2-celled, both cells or the anterior only opening by an apical pore. Seeds angled, rugose or echinulate, wingless, or discoid and winged.—DISTRIB. Chiefly in the temperate regions of the world; species 130.

1. **Linaria ramosissima,** *Wall. Pl. As. Rar.* v. 2 (1831) p. 43, t. 153. A perennial herb often much-branched from the base; branches slender, terete, prostrate or suberect, 1–2½ ft. long, usually glabrous. Leaves alternate, very variable, ½–1¾ in. long, variable in breadth, glabrous or the lower sometimes pubescent, the lower 5–7-lobed, triangular-hastate, the upper usually lanceolate-sagittate; petioles ¼–½ in. long, filiform. Flowers yellow, usually axillary, solitary; pedicels capillary, ½–1½ in. long, ebracteate. Calyx ⅕ in. long, divided almost to the base, hairy, often becoming glabrous in fruit; segments linear-lanceolate, acute, from an ovate membranously-margined base. Corolla (including the spur) nearly ½ in. long, pubescent outside; spur ⅛ in. long; upper lip 2-lobed, the lobes $\frac{1}{16}$ in. long, oblong, obtuse; the lower lip 3-lobed, the lobes spreading, $\frac{1}{12}$ in. long, oblong, obtuse. Stamens didynamous;

filaments more or less pubescent. Ovary subglobose; style stout, $\frac{1}{12}$ in. long, glabrous or nearly so. Capsules ovoid or subglobose, $\frac{1}{8}$ in. in diam. Seeds small, echinulate. Fl. B. I. v. 4, p. 251; Dalz. & Gibs. p. 176; Wight, Ill. t. 165; Aitch. Pb. & Sind Pl. p. 105; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174; Watt, Dict. Econ. Prod. v. 4, p. 642. *Linaria* (sp.), Grah. Cat. p. 142.—Flowers: Sept.

Throughout the Presidency, tolerably common. KONKAN: *Stocks*!; Bassein hills, *Dalzell & Gibson*. DECCAN: *Stocks*!, *Dalzell & Gibson*, *Cooke*!; Dongergaon, near Ahmednagar, *Cooke*!; Poona, *Cooke*!, *Woodrow*!; Ghát between Wai and Panchgani, plentiful, *Cooke*! S. M. COUNTRY: Belgaum, *Dalzell & Gibson*. GUJARAT: *Stocks*!; Ahmedabad, *Dalzell & Gibson*. SIND: *Stocks*!, *Dalzell & Gibson*.—DISTRIB. Throughout India, usually in rocky or stony places; Afghanistan, Ava.

EXCLUDED SPECIES.

LINARIA CABULICA (Benth. in DC. Prodr. v. 10 (1846) p. 270), which differs from *L. ramosissima*, Wall., in being softly hirsute and having smaller and more entire leaves and a larger corolla than that plant, with a spur which is usually longer than the corolla-tube, does not appear to occur in the Bombay Presidency. The specimens in Herb. Kew. from Stocks (1025!) and Lace (3479!) are from Beluchistan. *Linaria ramosissima*, var. *pubescens*, Hook. f. Fl. B. I. v. 4, p. 251, of which a solitary sheet occurs in Herb. Kew. (*Stocks*, 101!) to which no locality has been assigned, seems certainly to be *L. cabulica*. Stocks, in his MSS. note attached to the sheet in question, was of opinion that this might be the case. The length of the spur, the only character by which it would appear to differ, is not a very constant one, the spur in some authenticated specimens of *L. cabulica* not being longer than the corolla-tube. In fact Boissier (Fl. Orient. v. 4, p. 368) describes it as shorter.

4. **SCHWEINFURTHIA,** A. Braun.

Annual or perennial branched usually glabrous herbs. Leaves usually alternate, quite entire. Flowers small, axillary. Calyx 5-partite; segments imbricate, the upper the largest. Corolla-tube large, subsaccate at the base, not spurred; limb 2-lipped, the upper lip erect, 2-lobed, the lower 3-lobed, the mid-lobe narrower than the lateral; palate closing the throat. Stamens 4, fertile, didynamous (the 5th rudimentary); anthers 2-celled, the cells divaricate after flowering. Style filiform; stigma minute. Capsule subglobose, fragile, 2-celled, the upper cell small, 3–4-seeded or empty, the lower longer and broader, large, many-seeded, bursting irregularly. Seeds obconic, ribbed or winged, truncate at both ends.—DISTRIB. N.E. Africa, Arabia, Afghanistan, Beluchistan, Sind; species 3.

Leaves ovate or obovate; ribs of the seeds acute	1. *S. sphærocarpa*.
Leaves linear; ribs of the seeds obtuse	2. *S. pedicellata*.

1. **Schweinfurthia sphærocarpa,** *A. Braun, in Monatsb. Akad. Wiss. Berl.* (1866) p. 875. A subglabrous glaucous herb 6–12 in. high, from a perennial root; stems ascending, glabrous or puberulous. Leaves ill-smelling when bruised, somewhat succulent, variable, $\frac{1}{2}$–1 by $\frac{1}{4}$–$\frac{3}{4}$ in., elliptic or ovate, sometimes slightly obovate or so much attenuated at the base as to be subspathulate, acute, often apiculate, entire, sparsely clothed on both sides with very minute hairs or glabrous, base usually attenuated into a short petiole. Flowers axillary; pedicels equalling the petiole, deflexed in fruit. Calyx 5-partite, the upper segment very large, reaching $\frac{5}{8}$ by $\frac{1}{2}$ in. in fruit, broadly ovate, subcordate, acute,

veined, the remaining segments in fruit $\frac{1}{3}$ by $\frac{1}{8}$ in., lanceolate, acute. Corolla scarcely $\frac{1}{2}$ in. long, dingy-white with purple veins; upper lip 2-lobed; lobes oblong, obtuse, $\frac{1}{20}$ in. long; lower lip 3-lobed, spreading, the lobes oblong, obtuse. Capsules $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., obliquely globose, 2-celled, the lower cell many-seeded, the upper very small, 3-4-seeded. Seeds obconic, $\frac{1}{20}$ in. long, truncate at both ends, acutely winged, pale. Fl. B. I. v. 4, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174; Watt, Dict. Econ. Prod. v. 6, part 2, p. 489. *Linaria sphærocarpa*, Benth. in DC. Prodr. v. 10, p. 287; Aitch. Pb. & Sind Pl. p. 105. *Antirrhinum glaucum*, Stocks, ex Wight, Icon. t. 1459.—Flowers: Dec. VERN. *Sannipát.*

SIND: *Cooke*!, *Dalzell*, 79!, *Woodrow*, *Stocks*, 521!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. Beluchistan, Afghanistan.

The powdered fruit and leaves are sold as a drug which native practitioners prescribe in typhoid fever. The powder is used as snuff for bleeding at the nose. See Watt, Dict. Econ. Prod. l. c.

2. **Schweinfurthia pedicellata,** *Benth. & Hook. f. Gen. Pl.* v. 2 (1876) p. 934 (by error *pedicellaris*). Suffruticose, erect, branched; stem and branches usually greyish, glabrous or rarely with a few scattered glandular hairs. Leaves $\frac{1}{2}$–$1\frac{1}{4}$ by $\frac{1}{30}$–$\frac{1}{12}$ in., sessile, linear, subacute. Flowers axillary, solitary; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, capillary. Calyx $\frac{1}{5}$ in. long, 5-partite, glabrous; segments $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate, acute, the upper slightly longer and broader than the other 4. Corolla 2-lipped, $\frac{1}{3}$ in. long, parallel-veined and with 2 lines of hairs in the throat at the lower side; upper lip erect, 2-lobed, the lobes $\frac{1}{12}$ in. long, oblong, rounded at the apex; lower lip 3-lobed, the lobes oblong-rounded, the middle lobe longer and narrower than the lateral ones. Stamens 4 (with a rudimentary 5th), didynamous, the lower pair the longer; filaments hairy at the base; anthers divaricate. Ovary glabrous; style glabrous. Capsules $\frac{1}{8}$–$\frac{1}{4}$ in. in diam., globose, fragile, 2-celled, the upper cell with few seeds or empty. Seeds $\frac{1}{20}$ in. long, obconic, truncate at both ends, strongly ribbed with longitudinal obtuse ribs. *Anarrhinum pedicellatum*, T. Anders. Flor. Aden. in Journ. Linn. Soc. v. 5, Suppl. 1 (1860) p. 26.

SIND: rare, *Cooke*!—DISTRIB. Arabia.

5. **SUTERA,** Roth.

Herbs or small shrubs, annual or perennial, glabrous, pubescent or hispid, sometimes viscid. Leaves mostly opposite (the upper sometimes alternate), subentire, pinnatifid, or more or less toothed. Flowers axillary or in terminal simple (rarely compound) spikes or racemes; bracts not adhering along the pedicel. Calyx usually 5-partite; segments sublinear or rarely ovate, more or less imbricate in bud. Corolla tubular, not spurred at the base, deciduous; tube long or short, cylindric or infundibuliform, straight or more or less curved; throat dilated or not; limb regular or 2-lipped; lobes entire, or shortly 2-fid or emarginate, equal or nearly so, imbricate in bud, the 2 upper exterior. Stamens 4, didynamous, exserted, or some or all included; filaments filiform, inserted in the corolla-tube; anthers reniform, perfect, 1-celled by confluence of the cells. Ovary 2-celled; ovules numerous; style filiform, included or exserted, slightly dilated upwards. Capsule septicidal,

2-valved, the valves bifid. Seeds rugose.—DISTRIB. Species about 115, chiefly natives of S. Africa.

1. **Sutera glandulosa,** *Roth, Nov. Pl. Sp.* (1821) p. 291. Annual, diffuse, or sometimes suberect, viscidly-pubescent, branched from the base or near it; branches 6–12 in. long, viscidly glandular-pubescent. Leaves ¼–¾ by ⅛–½ in., ovate in outline, pinnatifid, the segments toothed and cut, base tapering into a short petiole. Flowers axillary, solitary, or the uppermost racemose; pedicels glandular-pubescent, rarely reaching ⅛ in. long, sometimes almost 0. Calyx ⅒–⅛ in. long, divided to the base or very nearly so, glandular-pubescent; segments linear-oblong, subacute. Corolla white, ⅛–⅕ in. long, divided about one-third the way down, glabrous; lobes oblong, obtuse, subequal. Stamens 4, didynamous. Style short; stigma notched. Capsules ⅛ in. long, ovoid-oblong, septicidal, with 2 bifid valves, viscidly pubescent or glabrous. Seeds minute, ⅒ in. long, yellowish, minutely pitted. Fl. B. I. v. 4, p. 258; Wight, Icon. t. 856; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Dec.–Feb. VERN. *Bhul.*

KONKAN: *Stocks*! DECCAN: Nasik, *Vadekar*!; Diksal, *Bhiva*!; Karli, *Kanitkar*!; bank of Mutha river near Poona, *Woodrow*!—DISTRIB. India (Behar, Bengal, W. Peninsula); Arabia, Egypt, Nubia.

6. **MONIERA,** B. Juss. ex P. Browne, Hist. Jamaic. (1756) p. 269.

HERPESTIS, Gærtn. Fruct. v. 3 (1805) p. 186, t. 214.

Glabrous herbs. Leaves often punctate, entire or toothed, or submerged and multifid. Flowers axillary, solitary or racemose; bracteoles small or 0. Calyx 5-partite; segments imbricate, the upper largest, the 2 lateral innermost, often very narrow. Corolla 2-lipped; tube cylindric; lips spreading, the upper outer in bud, notched or 2-lobed, the lower lip 3-lobed. Stamens didynamous, included; anthers sometimes approximate in pairs, the cells contiguous, parallel, distinct. Ovary 2-celled; ovules many in each cell; style dilated at the top; stigma entire or 2-lobed. Capsule globose or ovoid, 2-grooved; valves 2 or 4, separating from an entire column. Seeds many, minute.—DISTRIB. Warmer regions of both hemispheres: species about 50.

The name *Moniera* was given to the genus in 1756, and is therefore prior to the name *Herpestis*, which was given to it 49 years later by Gærtner. Although a genus *Monnieria*, Linn., exists under the Order *Rutaceæ*, that too is of subsequent date (1759) to the genus *Moniera*, Juss.

Leaves obovate-oblong or spathulate; flowers pedicellate; capsule ovoid, acute	1. *M. cuneifolia.*
Leaves linear-lanceolate; capsule globose.	
Flowers sessile, solitary	2. *M. Hamiltoniana.*
Flowers pedicellate, 1–3 in an axil	3. *M. floribunda.*

1. **Moniera cuneifolia,** *Michaux, Fl. Bor. Amer.* v. 2 (1803) p. 22 (*Monniera*). A glabrous somewhat succulent creeping herb; stems 4–12 in. long, rooting at the nodes; branches numerous, ascending. Leaves sessile, decussate, ¼–1 by ⅒–⅜ in., obovate-oblong or spathulate, rather fleshy, dotted with black specks, very obtuse, quite entire; nerves obscure. Flowers axillary, solitary; bracteoles ⅕ in. long, linear;

pedicels $\frac{1}{4}$–$1\frac{1}{4}$ n. long, slender. Calyx glabrous, divided to the base; upper sepal $\frac{1}{4}$ by $\frac{1}{8}$–$\frac{1}{6}$ in., ovate, acute; the other 4 sepals slightly shorter than the upper; the 2 inner lateral ones $\frac{1}{16}$ in. wide, lanceolate, acute. Corolla pale-blue or almost white, $\frac{1}{3}$ in. long; lobes nearly equal, rounded, spangled when fresh with shining dots. Anthers bluish-purple; pollen white. Capsules $\frac{1}{5}$ in. long, ovoid, acute, pointed with the style-base, glabrous. Seeds about $\frac{1}{30}$ in. long, oblong, striate, pale. Hiern, in Dyer, Fl. Capen. v. 4, Sec. 2 (1904) p. 355. *Herpestis Monnieria*, H. B. & K. Nov. Gen. & Sp. Pl. v. 2 (1817) p. 366; Benth. in DC. Prodr. v. 10, p. 400; Trim. Fl. Ceyl. v. 3, p. 246. *Herpestis Monniera*, Benth. Scroph. Ind. p. 30; Hook. f. Fl. B. I. v. 4, p. 272; Grah. Cat. p. 144; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174; Watt, Dict. Econ. Prod. v. 4, p. 225. *Herpestes Monnieria*, Dalz. & Gibs. p. 178. *Gratiola Monnieria*, Linn. Cent. Pl. ii. n. 120 in Amœn. Acad. v. 4 (1759) p. 306.—Flowers: Jan.–May. VERN. *Bám*; *Nira-bráhmi*.

Throughout the Presidency in damp places. KONKAN: Marmagão, *Bhiva*! DECCAN: *Woodrow*; Lanoli, *Cooke*!; Dongergaon near Ahmednagar, *Cooke*!; Mahableshwar, *Cooke*!; Khandala, *Kanitkar*! SIND: *Woodrow*; Landhi, *Cooke*!—DISTRIB. Throughout India in wet places; Ceylon and all warm countries.

The stalks and leaves are used medicinally by the Hindus, who consider them diuretic and aperient. According to Roxburgh, the expressed juice mixed with petroleum is used as an external application in rheumatism. It is also taken internally as a nervine tonic. See Watt, Dict. Econ. Prod. l. c.

2. **Moniera Hamiltoniana,** *T. Cooke.* Erect or decumbent at the base, stout, 3–10 in. high, glabrous; stem simple or branched. Leaves subsessile, $\frac{1}{2}$–1 by $\frac{1}{10}$–$\frac{1}{5}$ in., linear-lanceolate, acute, entire or subserrate, attenuated at the base; nerves obscure. Flowers sessile, axillary, opposite, solitary; bracteoles $\frac{1}{20}$–$\frac{1}{12}$ in. long, linear-subulate. Calyx $\frac{1}{6}$ in. long; upper sepal broadly ovate, acute, almost as broad as long, reticulately veined; the 2 lateral sepals narrowly lanceolate, $\frac{1}{20}$ in. broad, membranous. Corolla bluish-pink with purple veins; tube hemispheric, attenuated upwards, scarcely exceeding the calyx; limb subbilabiate, the upper lip deeply emarginate. Anthers white (*C. B. Clarke*). Capsules globose, $\frac{1}{8}$ in. in diam., glabrous. Seeds narrowly oblong, yellowish-brown, usually acute at one or both ends. *Herpestis Hamiltoniana*, Benth. Scroph. Ind. (1835) p. 30; Hook. f. Fl. B. I. v. 4, p. 272; Dalz. & Gibs. p. 178; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.

Rare in the Bombay Presidency except at Malwán. KONKAN; *Stocks*!, *Law*!; Malwán, plentiful, *Dalzell*!—DISTRIB. India (Northern provinces, Panjáb, Bengal, Assam, Silhet, W. Peninsula); Senegal.

3. **Moniera floribunda,** *T. Cooke.* Erect, 3–12 in. high; stem subquadrangular, slender, glabrous, more or less branched. Leaves subsessile, $\frac{1}{2}$–$1\frac{1}{4}$ by $\frac{1}{16}$–$\frac{1}{8}$ in., linear or linear-lanceolate, acute, entire, finely punctate. Flowers numerous, 1–3 (commonly 2) together in an axil; bracteoles $\frac{1}{16}$ in. long, subulate, inserted on the pedicel a little below the calyx; pedicels $\frac{1}{10}$–$\frac{1}{6}$ in. long. Calyx puberulous; upper sepal $\frac{1}{5}$–$\frac{1}{4}$ by $\frac{1}{6}$ in., ovate, subacute, reticulately veined; the 2 lateral sepals narrow, linear-lanceolate, acute, reticulately veined, membranous. Corolla not seen. Capsules $\frac{1}{8}$ in. long, subglobose or broadly ovoid. Seeds $\frac{1}{50}$ in. long, oblong, truncate at both ends, brown. *Herpestis*

floribunda, R. Br. Prodr. (1810) p. 442; Hook. f. Fl. B. I. v. 4, p. 273; Trim. Fl. Ceyl. v. 3, p. 246; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Feb.

The occurrence of this plant in the Bombay Presidency is somewhat doubtful. Woodrow in his list of Bombay plants (*l. c.*) reports its occurrence in S. Kanara, which is outside our area. Law has, in Herb. Kew., specimens from Kanara and Mysore, and of these the Kanara ones are most probably also from S. Kanara.—DISTRIB. S. India; Ceylon, Java, Australia, Tropical Africa.

7. **MIMULUS,** Linn.

Decumbent or erect herbs, glabrous, pilose or viscid. Leaves opposite. Flowers axillary, solitary. Calyx tubular, pentagonal, 5-lobed; lobes short. Corolla 2-lipped; tube cylindric; upper lip 2-lobed, outer in bud, erect or reflexed; lower lip 3-lobed, spreading; throat with usually a swollen 2-lobed palate. Stamens 4, didynamous, inserted near the base of the corolla-tube, included or exserted under the upper lip; filaments filiform; anthers 2-celled, the cells at length confluent at the apex. Ovary 2-celled; ovules many in each cell; style filiform; stigma 2-lamellate. Capsule oblong or sublinear, loculicidal, 2-valved, the valves entire or rarely 2-fid. Seeds numerous, minute, oblong.—DISTRIB. Species about 60, chiefly extra-tropical American.

1. **Mimulus gracilis,** *R. Br. Prodr.* (1810) p. 439. A perennial erect ascending or decumbent glabrous herb 6–20 in. high, branched near the base; stem and branches quadrangular, striate. Leaves radical and cauline, 1½–3 by ⅓–¾ in., sessile (or the lower sometimes shortly petiolate), ½-amplexicaul, linear-oblong or oblong-lanceolate, usually obtuse, entire or nearly so, glabrous, base slightly narrowed. Flowers solitary in each axil; pedicels slender, ½-1½ in. long. Calyx 5-angled, ¼ in. long in flower (slightly enlarged in fruit); teeth $\frac{1}{10}$ in. long, deltoid, acute. Corolla ⅜–½ in. long, glabrous; tube cylindric below and but little dilated above; lobes shallow, rounded. Stamens included; filaments glabrous; anthers subreniform. Ovary glabrous; stigma 2-lamellate. Capsules ¼ in. long, obovoid, included in the slightly enlarged calyx. Seeds minute, about $\frac{1}{60}$ in. long, oblong-ellipsoid, smooth. Fl. B. I. v. 4, p. 259; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Mar.–Apr.

Not common. DECCAN: Poona, *Woodrow*!; Máwal taluka, river bank, *Bhiva*!; Mutha canal, right bank, *Kanitkar*!—DISTRIB. India (W. Himalaya, Panjáb, Behar, N. Bengal, W. Peninsula); China, Australia, Tropical and S. Africa.

8. **STEMODIA,** Linn.

Herbs sometimes woody below, glandular-pubescent, often aromatic. Leaves opposite or 3–4-nately whorled. Flowers axillary, solitary, passing into terminal leafy spikes or close racemes; bracts leafy; bracteoles 1 or 2. Calyx 5-partite; segments narrow, imbricate, all equal or the upper a little larger. Corolla 2-lipped; tube cylindric; upper lip exterior, suberect, entire or notched, the lower lip spreading, 3-lobed, the throat not plicate. Stamens 4, didynamous, included; filaments filiform; anther-cells stalked, distinct, all fertile. Ovary 2-celled; ovules numerous in each cell; style dilated at the apex, not winged above; stigma usually 2-lobed. Capsule globose, ovoid or acuminate; valves 2, bifid, dehiscing

septicidally, or valves 4 dehiscing both septicidally and loculicidally. Seeds minute, numerous.—DISTRIB. Tropical and S. America, Australia, Africa, Tropical Asia; species about 26.

Flowers pedicelled; corolla twice as long as the calyx ..... 1. *S. viscosa.*
Flowers subsessile; corolla scarcely longer than the calyx..... 2. *S. serrata.*

1. **Stemodia viscosa,** *Roxb. Cor. Pl.* v. 2 (1798) p. 33, t. 163. Erect, much-branched, 3–24 in. high, aromatic; stem and branches angular, viscidly pubescent. Leaves variable, ½–1¾ by ⅛–½ in., sessile, usually oblong, acute (rarely obovate), serrulate or subentire, glandular-pubescent or nearly glabrous, usually tapering, often cordate and amplexicaul at the base. Flowers axillary, solitary, or in terminal few-flowered racemes; pedicels filiform, ¼–⅓ in. long; bracteoles 2, a little below the calyx, linear-subulate, $\frac{1}{12}$ in. long. Calyx ⅛ in. long, 5-partite; sepals narrowly lanceolate, acute, glandular-hairy and ciliate. Corolla ⅓ in. long, violet, glabrous; upper lip broad, entire or emarginate; lower lip hairy in the throat, with 3 rounded or emarginate lobes of about equal length, the mid-lobe the broadest. Filaments glabrous; anther-cells shortly stalked, suborbicular. Ovary glabrous. Capsules ¼ in. long, ovoid-oblong, acuminate, glabrous, 4-valved, slightly longer than the sepals. Seeds oblong-ellipsoid, about $\frac{1}{60}$ in. long. Fl. B. I. v. 4, p. 265; Grah. Cat. p. 143; Dalz. & Gibs. p. 176; Wight, Icon. t. 1408; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174; Watt, Dict. Econ. Prod. v. 6, part 3, p. 359.—Flowers: Nov.–Dec.

KONKAN: *Stocks!*; Kalyan (rice-field near Railway Station), *Woodrow!* DECCAN: *Woodrow!*; Kolhapur, *Cooke!* GUJARAT: Verâwal, *Woodrow*; Unkleshvar, *Woodrow.*—DISTRIB. Central and Western India; Afghanistan.

2. **Stemodia serrata,** *Benth. in DC. Prodr.* v. 10 (1846) p. 381. A robust leafy erect viscidly-pubescent annual; stem obtuse, 4-angled. Leaves ¼–1½ by ⅛–½ in., sessile, narrowly obovate-oblong, acute, serrulate above the middle, entire below it, base narrowed, amplexicaul. Flowers subsessile, or very shortly pedicelled, axillary, solitary; bracteoles 2 beneath the calyx, linear-subulate, about $\frac{1}{12}$ in. long. Calyx ⅕ in. long, divided almost to the base, glandular-hairy; segments ⅛ in. long, linear-lanceolate, acute. Corolla ⅕–¼ in. long; upper lip bifid; lower lip with 3 subequal, oblong obtuse lobes. Ovary glabrous. Capsules linear-oblong, acute, slightly shorter than the persistent calyx, glabrous. Seeds minute, less than $\frac{1}{60}$ in. long, oblong-ellipsoid. Fl. B. I. v. 4, p. 265; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Dec.–Feb.

KONKAN: *Stocks!*, *Law!*; Pen, *Kanitkar!*—DISTRIB. India (W. Peninsula); Nubia, Egypt, Senegambia.

9. LIMNOPHILA, R. Br.

Herbs often paludine or aquatic, glabrous or pubescent, aromatic. Leaves transparently dotted, opposite or whorled, toothed or cut, or, where submerged, often multifid. Flowers sessile or pedicelled, axillary, solitary, or passing into terminal spikes or racemes; bracts usually leafy; bracteoles small or 0. Calyx 5-partite; segments subequal or the upper the largest. Corolla 2-lipped; tube cylindric; upper lip outermost, suberect, entire or 2-fid; lower lip spreading, 3-lobed, throat not plicate. Stamens 4, didynamous, included; anther-cells usually separate and stalked, rarely contiguous. Ovary 2-celled; ovules numerous in each

cell; style slender, deflexed at the top; stigma 2-lamellate. Capsule ovoid or oblong, opening both septicidally and loculicidally, the placentiferous dissepiment separating with the valves. Seeds numerous, small, angular, truncate.—DISTRIB. Warmer regions of Africa, Asia, and Australia; species about 25.

Leaves pinnately nerved; no whorls of pinnatifid or multifid leaves.
- Calyx not striate in fruit; leaves opposite, petiolate; flowers sessile ..... 1. *L. Roxburghii.*
- Calyx striate in fruit.
  - Flowers sessile ..... 2. *L. conferta.*
  - Flowers pedicellate ..... 3. *L. gratissima.*

Leaves with 3–5 parallel nerves running from base to tip, or lower leaves whorled, pinnatifid or multifid; fruiting calyx not striate.
- Flowers sessile or nearly so.
  - Flowers white, in terminal and axillary often divaricately branched slender spikes 2–3 in. long ..... 4. *L. polystachya.*
  - Flowers pink, usually axillary, solitary ..... 5. *L. sessiliflora.*
- Flowers pedicellate; pedicels usually longer than the calyx.
  - Stem 1–2 ft.; corolla ½ in. long or more ..... 6. *L. racemosa.*
  - Stem 3–8 in.; corolla ⅛ in. long. Plant strongly of turpentine ..... 7. *L. gratioloides.*

1. **Limnophila Roxburghii,** *G. Don, Gen. Syst.* v. 4 (1837) p. 543 (*not* of Benth.). An erect very aromatic herb 1–2 ft. high; stems many, stout, glabrous. Leaves all opposite, 1–3 by ⅝–1½ in., elliptic-lanceolate, acute or subobtuse, crenulate, glabrous or pubescent, often hairy on the nerves beneath, transparent-dotted, base acute; main nerves pinnate, arching from the midrib, numerous, strong and prominent beneath; petioles variable, sometimes reaching ¾ in. long, sometimes hardly any. Flowers sessile, in axillary shortly pedunculate heads, rarely solitary. Calyx not divided quite to the base, pubescent outside; tube $\frac{1}{10}$ in. long; upper segment ¼ in. long, linear-oblong, subobtuse, ciliate, broader than the other 4 which are ⅕ in. long, narrowly lanceolate, very acute, ciliate. Corolla rather less than ½ in. long, bluish-purple with a yellow mouth, pubescent outside; lower lip with yellow hairs in the throat. Capsules ¼ in. long, oblong-ellipsoid, glabrous. Seeds scarcely $\frac{1}{30}$ in. long, angular, truncate. Fl. B. I. v. 4, p. 265; Grah. Cat. p. 143; Dalz. & Gibs. p. 177; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174. *Limnophila Menthastrum*, Benth. in DC. Prod. v. 10, p. 386; Dalz. & Gibs. p. 177.—Flowers: Sept.

KONKAN: *Stocks*!; Talkat Ghát, *Dalzell & Gibson.* KANARA: Kumpta, *Woodrow.*—DISTRIB. More or less throughout India; Java, China, Philippines, Pacific Islands.

2. **Limnophila conferta,** *Benth. in DC. Prodr.* v. 10 (1846) p. 387. Erect or procumbent; stem stout, spongy, usually prostrate or floating below, with long roots from the nodes, glabrous or more or less hairy. Leaves with a strong camphoraceous odor and taste, subsessile, ¾–1¼ in. long, oblong or elliptic-oblong, obtuse, crenate-serrate, punctate beneath, rather thick, dull pale-green, glabrous, base narrowed or subamplexicaul; nerves inconspicuous. Flowers axillary, solitary or in short leafy axillary spikes; bracteoles beneath the calyx $\frac{1}{16}$ in. long, linear-subulate. Calyx ⅛–⅕ in. long, not divided quite to the base, usually hairy, becoming striate

in fruit; segments $\frac{1}{8}$ in. long, subequal, linear-lanceolate, very acute, the tips spreading. Corolla about $\frac{1}{3}$ in. long, violet-pink. Capsules $\frac{1}{8}$ in. long, broadly ellipsoid, enclosed in the striate persistent calyx. Seeds scarcely $\frac{1}{50}$ in. long. Fl. B. I. v. 4, p. 266; Dalz. & Gibs. p. 177; Trim. Fl. Ceyl. v. 3, p. 243; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Nov.

KONKAN: *Stocks*!; Malwán, *Dalzell*! KANARA: Kumpta in rice-fields, *Woodrow*.—DISTRIB. More or less throughout India; Ceylon.

3. **Limnophila gratissima,** *Blume, Bijdr.* (1826) p. 749. Stem decumbent at the base, copiously rooting at the lower nodes, then erect, not much branched, 12–20 in. long, stout, terete, spongy, glabrous, striate. Leaves 1–2 by $\frac{1}{4}$–$\frac{3}{4}$ in., opposite, or more commonly in whorls of 3, sessile, $\frac{1}{2}$-amplexicaul, lanceolate-oblong, acute, sharply serrate, glabrous; nerves few, inconspicuous. Flowers on long slender glandular pedicels, solitary and axillary, or in axillary and terminal racemes; bracteoles beneath the calyx $\frac{1}{16}$ in. long, linear-subulate; pedicels $\frac{1}{2}$-1 in. long. Calyx $\frac{1}{4}$ in. long, not divided quite to the base, glandular, becoming striate in fruit; segments lanceolate, acute, subequal, with spreading tips. Corolla $\frac{1}{2}$ in. long, purplish. Capsules rather less than $\frac{1}{4}$ in. long, ovoid-oblong, covered by the striate calyx. Seeds about $\frac{1}{60}$ in. long, truncate at both ends. Fl. B. I. v. 4, p. 268; Grah. Cat. p. 144; Dalz. & Gibs. p. 177; Trim. Fl. Ceyl. v. 3, p. 243.

Margins of ponds, *Dalzell & Gibson*. KONKAN: *Stocks*!, *Law*!—DISTRIB. India (W. Peninsula); Ceylon, Malay and Philippine Islands, China, Japan, N. Australia.

4. **Limnophila polystachya,** *Benth. Scroph. Ind.* (1835) p. 26. Floating, glabrous or minutely puberulous; stem 6–24 in. long, erect or ascending from the floating portion which is densely clothed with multifid leaves. Lower leaves capillaceo-multifid; upper leaves opposite or 3–4-nately whorled (or in the case of very small plants all the leaves pinnatisect), linear-oblong or lanceolate, sessile, $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{10}$–$\frac{3}{8}$ in., crenulate; nerves 3–5, running from the base to the tip. Flowers sessile, in terminal and axillary often divaricately branched slender spikes 2–3 in. long; bracteoles $\frac{1}{10}$–$\frac{1}{8}$ in. long, linear-lanceolate. Calyx $\frac{1}{8}$ in. long, membranous, glabrous, not striate in fruit, divided about $\frac{1}{2}$-way down or less; segments deltoid-ovate, acute, subequal. Corolla $\frac{1}{3}$ in. long, white. Capsules $\frac{1}{10}$–$\frac{1}{8}$ in. long, subglobose. Fl. B. I. v. 4, p. 269; Wight, Icon. t. 860; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Jan.

Not common. S. M. COUNTRY: Belgaum, *Cooke*! KANARA: N. Kanara, *Woodrow*.—DISTRIB. India (W. Peninsula).

5. **Limnophila sessiliflora,** *Blume, Bijdr.* (1826) p. 749. Stem glabrous or pubescent. Leaves sessile; the upper often undivided, lanceolate, acute, serrate or dentate, 3-nerved; the lower pinnatisect with numerous very narrow segments, rarely capillaceo-multifid. Flowers axillary, solitary, sessile or shortly pedicellate, or the terminal arranged in a short spike or raceme. Calyx membranous, rather less than $\frac{1}{4}$ in. long, clothed with short gland-tipped hairs, divided about $\frac{1}{2}$-way down, not striate in fruit; segments lanceolate, long-pointed, very acute. Corolla $\frac{3}{8}$ in. long, pink. Capsules $\frac{1}{5}$ in. long, subglobose, glabrous. Seeds about $\frac{1}{30}$ in. long, truncate at both ends. Fl. B. I. v. 4, p. 270;

Trim. Fl. Ceyl. v. 3, p. 244. *Limnophila heterophylla*, Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174 (*not* of Benth.).—Flowers: Oct.–Nov.

DECCAN: Mahableshwar, *Cooke*!, *Woodrow*! S. M. COUNTRY: Belgaum, *Cooke*! —DISTRIB. Throughout India in rice-fields and swampy places; Ceylon, Java, Japan.

6. **Limnophila racemosa,** *Benth. Scroph. Ind.* (1835) p. 26. Stem 1–2 ft. long or in deep water longer, stout, erect, mostly submerged, glabrous or hairy. Upper leaves sessile, 1½–2 by ¼–½ in., opposite or 3-nately whorled, ½-amplexicaul and somewhat rounded at the base, oblong-lanceolate, serrate-dentate, glabrous, strongly 3–5-nerved; lower leaves submerged, capillaceo-multifid, often deflexed and root-like. Flowers large, usually in long erect leafy racemes 2–4 in. long; bracteoles $\frac{1}{10}$ in. long, linear-subulate; pedicels ⅕–½ in. long, filiform. Calyx ⅕ in. long, thinly membranous, glabrous, not striate in fruit, divided about ½-way down; segments deltoid-ovate, acute, sometimes colored. Corolla ½ in. or more long, pale-violet; lobes of the upper lip short, rounded, those of the lower lip ovate, acute. Capsules subglobose, ⅛ in. long, enclosed in the membranous calyx. Seeds scarcely $\frac{1}{30}$ in. long, truncate at both ends. Fl. B. I. v. 4, p. 271; Grah. Cat. p. 144; Dalz. & Gibs. p. 177; Wight, Icon. t. 861; Trim. Fl. Ceyl. v. 3, p. 245; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174. *Cyrilla aquatica*, Roxb. Cor. Pl. v. 2 (1798) p. 47, t. 189.—Flowers: Nov.–Jan. VERN. *Mahaka.*

KONKAN: *Law*!; Matheran, *Cooke*!, *Woodrow*! S. M. COUNTRY: Belgaum, *Cooke*! KANARA: N. Kanara, *Woodrow.*—DISTRIB. India (Bengal, Rajputana, W. Peninsula); Ceylon, Java.

7. **Limnophila gratioloides,** *R. Br. Prodr.* (1810) p. 442. A small plant 3–8 in. high, smelling strongly of turpentine; stems subquadrangular, slender, rooting at the lower nodes, glabrous, striate, usually much branched from the base. Leaves usually all whorled or pinnatifid, the upper sometimes entire and opposite, ¼–¾ by $\frac{1}{16}$–⅛ in., linear-oblong, serrate-dentate, 1-nerved, the lowest sometimes, though not commonly, capillaceo-multifid. Flowers solitary, axillary or racemose; bracteoles $\frac{1}{10}$ in. long, linear-subulate; pedicels ⅛–⅓ in. long, filiform, divaricate. Calyx membranous, thinly and finely glandular, not striate in fruit, ⅛–⅕ in. long in flower, hemispheric in fruit, divided scarcely ½-way down; segments narrowly triangular, acute. Corolla pink, ⅓ in. long. Capsules broadly ovoid or subglobose, ⅛ in. long. Seeds $\frac{1}{40}$ in. long, truncate or obscurely rounded at the ends. Fl. B. I. v. 4, p. 271; Grah. Cat. p. 143; Dalz. & Gibs. p. 177; Trim. Fl. Ceyl. v. 3, p. 245; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Nov.–Jan. VERN. *Turti.*

On the margins of tanks and in rice-fields. KONKAN: *Stocks*!; Pen, *Woodrow*; Matheran, *Cooke*! DECCAN: Lanoli, *Woodrow*!; Mahableshwar, *Woodrow*; rice-fields near Poona, *Gangaram*! GUJARAT: Dakor, *Woodrow.*—DISTRIB. Throughout India in wet places; Ceylon, Beluchistan, Malayan Archipelago, China, Australia, Tropical Africa.

10. **DOPATRIUM,** Buch.-Ham.

Annual slender glabrous marsh herbs. Leaves few, opposite, the lower small, the upper remote, minute. Flowers small, solitary, axillary,

usually violet; bracteoles 0; pedicels filiform or 0. Calyx small, 5-partite; segments narrow, imbricate. Corolla 2-lipped; tube slender below, dilated into a large throat; upper lip outer, short, 2-fid; lower lip broad, 3-lobed, spreading. Stamens: 2 upper perfect; filaments filiform; anther-cells parallel, distinct, equal; staminodes 2, minute, included in the tube. Style short; stigma 2-lamellate. Capsules globose or oblong, loculicidal; valves entire or rarely 2-fid, carrying away the placentas. Seeds numerous, very small, tuberculate.—DISTRIB. Asia, Africa, and Australia; species 5.

1. **Dopatrium junceum,** *Buch.-Ham. in Benth. Scroph. Ind.* (1835) p. 31. Somewhat fleshy; stems 6–12 in. long, usually much-branched at the base, the lower part swollen and spongy, the upper part slender. Leaves few, sessile, the lower oblong, elliptic or slightly obovate, obtuse, $\frac{1}{2}$–1 by $\frac{1}{4}$ in., the upper much smaller, remote, bract-like. Flowers axillary, opposite, distant; pedicels 0–$\frac{1}{2}$ in. long, filiform, erect in fruit. Calyx $\frac{1}{16}$ in. long, divided rather more than $\frac{1}{2}$-way down; segments oblong, obtuse. Corolla $\frac{1}{8}$–$\frac{1}{5}$ in. long, pale pinkish-violet. Ovary globose, 1-celled with 2 parietal placentas; style stout, about $\frac{1}{40}$ in. long; stigma broad, 2-lamellate. Capsules $\frac{1}{10}$ in. in diam., globose, 1-celled. Seeds $\frac{1}{40}$ in. long, oblong, tuberculate. Fl. B. I. v. 4, p. 274; Grah. Cat. p. 142; Dalz. & Gibs. p. 178; Trim. Fl. Ceyl. v. 3, p. 247; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174. *Gratiola juncea,* Roxb. Cor. Pl. v. 2 (1798) p. 16, t. 129.—Flowers: July–Sept.

Swampy places, *Dalzell & Gibson.* DECCAN: Neral, *Kanitkar!, Bhiva!, Woodrow.* KANARA: *Woodrow.*—DISTRIB. Throughout India in swampy places; Ceylon, Malay Islands, China, Japan, Philippines, Australia.

11. TORENIA, Linn.

Glabrous or pubescent herbs. Leaves opposite, entire, crenate or serrate. Flowers often showy, axillary or in terminal or pseudo-axillary umbels or racemes; bracteoles 0. Calyx tubular, 3–5-winged, or plaited, or keeled, 2-lipped or 3–5-toothed. Corolla 2-lipped; tube cylindric, somewhat curved, dilated upwards; upper lip erect, concave or pinched, notched or 2-fid; lower larger, spreading, 3-lobed. Stamens 4, didynamous; the 2 upper included in and adnate to the tube; the 2 lower adnate to the throat, often appendaged at the base, conniving under the upper lip; anthers touching or cohering in pairs, the cells often confluent. Ovary 2-celled; ovules many in each cell; style slender; stigma 2-lamellate. Capsule linear or oblong, not exceeding the calyx; valves separating from the placentiferous dissepiment. Seeds rugose or cancellate.—DISTRIB. Species 20, tropical Asiatic and African, one of them also American.

Stem erect or suberect; calyx winged; longer pair of filaments not toothed at the base ..... 1. *T. cordifolia.*
Stem creeping; calyx ribbed but not winged; longer pair of filaments toothed at the base ..... 2. *T. bicolor.*

1. **Torenia cordifolia,** *Roxb. Cor. Pl.* v. 2 (1798) p. 32, t. 161. An erect or suberect sparsely hairy herb 4–10 in. high; stems and branches 4-angled or sometimes almost 4-winged. Leaves $\frac{3}{4}$–1$\frac{1}{2}$ by $\frac{1}{2}$–1 in., ovate, acute or subobtuse, sharply serrate, glabrous, base usually

cuneate; petioles ¼–½ in. long. Flowers axillary, solitary or several together, fascicled or subumbellate towards the ends of the branches; pedicels slender, ½–1 in. or more long. Calyx ⅜ in. long, 2-lipped, ovoid, cordate or rounded, not decurrent at the base, 5-toothed; teeth ciliate; ribs prominently keeled. Corolla bluish-purple, ⅔ in. long; upper lip notched; lower lip equally 3-lobed. Stamens 4, in unequal pairs; filaments arching, the lower not toothed; anthers cohering in pairs. Capsules oblong, acute, enclosed in the persistent calyx. Seeds about $\frac{1}{30}$ in. long, truncate at both ends. Fl. B. I. v. 4, p. 276; Grah. Cat. p. 144; Dalz. & Gibs. p. 180; Bot. Mag. t. 3715; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Sept.–Oct.

KONKAN: *Law*!, *Stocks*!; S. Konkan, *Graham*; Vingorla, *Dalzell*! S.M. COUNTRY: Londa, *Cooke*!, *Woodrow*.—DISTRIB. India (W. Himalaya, Central India, Behar, W. Peninsula); Java, China.

2. **Torenia bicolor,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 38. Stem creeping and rooting at the nodes, angled, glabrous or nearly so. Leaves ½–1 by ⅜–¾ in., deltoid-ovate, crenate-serrate, sparsely hairy, base subcordate, truncate or rounded, rarely cuneate; petioles ⅓–½ in. long. Flowers axillary, 1–3 together; pedicels in flower ½–⅝ in. long, thickened in fruit and elongating to ¾ in. or more. Calyx glabrous, ½ in. long in flower, reaching ¾ in. long in fruit, very narrow, attenuated towards the base, 5-ribbed (the ribs not winged), 2-lipped, the upper lip with 3 short triangular teeth $\frac{1}{16}$ in. long, the lower lip 2-toothed, the teeth scarcely longer than those of the upper lip. Corolla 1–1¼ in. long; tube violet, curved, attenuated at the base; upper lip rounded, entire, violet; lower lip 3-fid, white (*Dalzell*). Filaments of the longer stamens toothed at the base. Capsules narrowly oblong, pointed, ⅜–½ in. long. Seeds $\frac{1}{50}$ in. in diam., subspherical, foveolate. Fl. B. I. v. 4, p. 278; Dalz. & Gibs. p. 181.—Flowers: July.

Very near to *Torenia asiatica*, Linn., of which it is perhaps a variety growing at a low elevation. Well worthy of a place in gardens (*Dalzell*).

KONKAN: *Stocks*!; Vingorla, *Dalzell*!—DISTRIB. India (W. Peninsula).

Torenia asiatica, Linn. Sp. Pl. (1753) p. 619. A diffusely branched nearly glabrous annual, creeping below, is often grown and frequently springs up spontaneously in gardens. It has ovate subcordate or lanceolate serrate leaves 1–2 in. long, on petioles usually about ¼ in long, a corolla 1¼–1½ in. long, bluish-purple, with dark violet lateral lobes. The longer filaments are toothed at the base. It is indigenous on the Nilghiris, is easily grown from cuttings, and makes a pretty basket plant in a moist conservatory. Fl. B. I. v. 4, p. 277; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174 & Gard. in Ind. ed. 5, p. 404. *Torenia bicolor*, Dalz., has apparently been mistaken for this, which it much resembles. —DISTRIB. India (W. Peninsula, Tenasserim); Ceylon, Java, China.

Torenia Fournieri, Linden, ex Fourn. in Illustr. Hortic. v. 23 (1876) p. 129, t. 249. An erect nearly glabrous annual, a native of Cochin-China, is often grown and sometimes springs up spontaneously in gardens. It has a broadly-winged calyx and showy purple flowers. The longer filaments are not toothed at the base. Woodr. Gard. in Ind. ed. 5, p. 404.

12. **ARTANEMA,** Don.

Erect herbs, the angles of the stem and upper surface of the leaves scabrid, otherwise glabrous. Leaves opposite, entire or serrate. Flowers large, blue or purple, racemose at the ends of the branches; pedicels solitary in the axils of foliaceous bracts; bracteoles 0. Calyx 5-partite; segments herbaceous, acuminate, with a broad base, much imbricate. Corolla 2-lipped; tube elongate, broad: upper lip erect, broad, emarginate; lower lip spreading, 3-fid. Stamens 4, perfect, didynamous; the 2 upper with short filaments included in the tube; the 2 lower with long arcuate filaments broadly appendiculate at the base, inserted on the throat, conniving at the apex under the upper lip; anthers approximate in pairs or cohering, the cells confluent at the tip. Ovary 2-celled; ovules many in each cell; stigma 2-lamellate. Capsule globose, septicidally dehiscent; valves entire, separating from the placentiferous axis. Seeds numerous, small, rugose.—DISTRIB. Tropical Asia, Australia, Africa; species 4.

1. **Artanema sessamoides,** *Benth. Scroph. Ind.* (1835) p. 39. A stout herb, 2–3 ft. high, sparingly branched; stem acutely quadrangular, glabrous, often tinged with purple. Leaves sessile or shortly petiolate, $1\frac{1}{2}$–6 by $\frac{3}{8}$–$1\frac{3}{4}$ in., lanceolate, acute or acuminate, entire or serrate, more or less scabrid. Flowers large, in erect lax terminal racemes; pedicels $\frac{1}{4}$–$\frac{5}{8}$ in. long; bracts beneath the pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long, lanceolate, acute. Calyx $\frac{1}{3}$–$\frac{7}{16}$ in. long, divided to the base or nearly so; sepals ovate, acute, nearly glabrous, much imbricate. Corolla dull violet-purple, $\frac{3}{4}$–$\frac{7}{8}$ in. long, reticulately veined; tube broad. Filaments of the lower stamens long, arching, dilated and furnished with a discoid appendage at the base. Capsules globose, $\frac{1}{4}$–$\frac{3}{8}$ in. in diam., glabrous. Seeds $\frac{1}{40}$ in. long, oblong, rounded or truncate at the ends, covered with white tubercles, yellowish. Fl. B. I. v. 4, p. 274; Grah. Cat. p. 144; Dalz. & Gibs. p. 181.

Rare in the Bombay Presidency. KONKAN: *Stocks*!, *Law*!, *Dalzell & Gibson*, *Nimmo* ex *Graham*.—DISTRIB. India (W. Peninsula); Ceylon, Malay Peninsula, Sumatra, Java, Philippine Islands, Borneo, Tropical Africa.

13. **VANDELLIA,** Linn.

Herbs usually annual, glabrous or pubescent. Leaves opposite, often toothed, penninerved. Flowers small, usually axillary; bracteoles 0. Calyx campanulate; segments 5, free or connate, not winged. Corolla 2-lipped; tube cylindric; upper lip outermost, erect, concave, notched or 2-fid; lower lip broader, spreading, 3-lobed. Stamens 4, didynamous, the 2 upper inserted on the corolla-tube, usually included, the 2 lower inserted on the corolla-throat with arched filaments which are furnished with a dentiform or subulate appendage at or towards the base; anthers touching or cohering in pairs under the upper lip, the cells divaricate. Ovary 2-celled; ovules many in each cell; style slender; stigma 2-lamellate. Capsule globose or ovoid, or long-cylindric, septicidally 2-valved; valves separating from the placentiferous dissepiment; placentas large. Seeds many, rugose.—DISTRIB. Species about 50, chiefly tropical Asiatic.

Calyx not divided below the middle; capsule oblong-ellipsoid. 1. *V. crustacea.*
Calyx partite to the base or nearly so.
Capsule subglobose, equalling or shorter than the calyx ... 2. *V. hirsuta.*
Capsule linear-lanceolate, much longer than the calyx ..... 3. *V. pedunculata.*

1. **Vandellia crustacea,** *Benth. Scroph. Ind.* (1835) p. 35. A diffuse glabrous or sparsely hairy annual 4–18 in. high, much-branched from the base; stems slender, angular. Leaves $\frac{3}{8}$–$\frac{3}{4}$ by $\frac{1}{4}$–$\frac{1}{2}$ in., ovate, subacute, coarsely but shallowly serrate or subentire, glabrous; petioles $\frac{1}{8}$–$\frac{3}{8}$ in. long. Flowers axillary and subracemose at the ends of the branches; pedicels $\frac{1}{2}$–$1\frac{1}{2}$ in. long, slender, strict. Calyx $\frac{1}{6}$–$\frac{1}{5}$ in. long in flower, elongating to $\frac{1}{4}$ in. long in fruit, 5-ribbed, divided about $\frac{1}{4}$-way down; teeth triangular, acute. Corolla $\frac{1}{3}$ in. long, purplish. Capsules $\frac{1}{5}$ in. long, ellipsoid-oblong, obtuse. Seeds about $\frac{1}{30}$ in. long, ellipsoid. Fl. B. I. v. 4, p. 279; Grah. Cat. p. 144; Dalz. & Gibs. p. 180; Wight, Icon. t. 863; Trim. Fl. Ceyl. v. 3, p. 250; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Aug.

KONKAN: Neral, *Woodrow*; Matheran, *Woodrow*; Ghotwade near Jambalpada, *Kanitkar*!—DISTRIB. Throughout India; Ceylon, Tropics of the Old World.

2. **Vandellia hirsuta,** *Buch.-Ham. in Benth. Scroph. Ind.* (1835) p. 36. Stem short, erect, with many long branches from near the base, clothed with spreading hairs. Leaves 1–2 by $\frac{1}{2}$–1 in., elliptic, subacute, crenate, serrate-dentate or subentire, more or less hairy on both sides, the lower leaves tapering into a broad petiole, the upper nearly sessile. Flowers in lax axillary and terminal racemes; pedicels $\frac{1}{4}$–$\frac{3}{8}$ in. long, slender; bracts beneath the pedicels $\frac{1}{16}$ in. long, lanceolate, acute. Calyx $\frac{1}{8}$–$\frac{1}{6}$ in. long, divided to the base; sepals linear-lanceolate, hairy, exceeding the capsule. Corolla $\frac{1}{4}$ in. long, pale-violet. Capsules subglobose, $\frac{1}{10}$ in. long. Seeds about $\frac{1}{50}$ in. long, truncate at both ends, yellowish. Fl. B. I. v. 4, p. 280; Dalz. & Gibs. p. 179; Trim. Fl. Ceyl. v. 3, p. 250; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174.—Flowers: Sept.

Tolerably common in the Konkan. KONKAN: *Law*!, *Stocks*!; Vingorla, *Dalzell*!; Kalyan, *Woodrow*.—DISTRIB. India (Bengal and Sikkim to Ava, W. Peninsula); Ceylon, Java, Borneo, China, Philippine Islands.

3. **Vandellia pedunculata,** *Benth. Scroph. Ind.* (1835) p. 37. A small glabrous diffusely branched herb; stem sometimes creeping at the base and rooting at the nodes, 4–10 in. long, striate, often tinged with purple. Leaves shortly petiolate or sometimes almost sessile, $\frac{1}{2}$–$\frac{3}{4}$ by $\frac{1}{3}$–$\frac{1}{2}$ in., ovate, subacute, crenate-serrate, glabrous, base subcordate. Flowers solitary, axillary; pedicels $\frac{3}{4}$–$1\frac{1}{4}$ in. long. Calyx $\frac{1}{8}$ in. long, divided to the base; sepals lanceolate, very acute. Corolla $\frac{3}{8}$ in. long, usually white with a pale violet margin, the lower lip marked with a yellow spot. Capsules twice as long as the calyx, linear-lanceolate, acute, tipped by the persistent style-base. Seeds scarcely $\frac{1}{30}$ in. long, ellipsoid. Fl. B. I. v. 4, p. 282; Dalz. & Gibs. p. 179; Trim. Fl. Ceyl. v. 3, p. 251. *Vandellia Roxburghii,* G. Don, Gen. Syst. v. 4 (1837) p. 549; Grah. Cat. p. 144.—Flowers: Aug.–Sept.

Not common in the Bombay Presidency. KONKAN: *Stocks*!; Vingorla, *Dalzell*!—DISTRIB. More or less throughout India in damp places such as rice-fields; Ceylon, Borneo, China, Cochin-China.

Excluded Species.

VANDELLIA LAXA, Benth. Scroph. Ind. (1835) p. 36 (*Vandellia scabra*, var. *laxa*, Hook. f. Fl. B. I. v. 4, p. 281), is noticed in Dalzell's 'Bombay Flora,' p. 179, as occurring at Vingorla in the Konkan. I have seen no specimens from Vingorla nor in fact from the Bombay Presidency at all. Though the country around Vingorla has been well examined by the plant-collectors of the Botanical Survey of W. India, the plant has not been discovered there by any of them nor does Woodrow include it in his list, while Sir J. D. Hooker (Fl. B. I. l. c.) has not seen any specimens from Vingorla.

14. **ILYSANTHES,** Rafin.

Annual slender glabrous marsh herbs. Leaves opposite, entire or toothed, 1–5-nerved from the base. Flowers small, axillary or passing into terminal racemes; pedicels often reflexed in fruit; bracteoles 0. Calyx deeply 5-lobed; segments narrow. Corolla 2-lipped; tube cylindric; upper lip erect, concave, notched; lower lip larger, 3-lobed, spreading. Stamens: the 2 upper perfect, subincluded, inserted on the corolla-tube; the lower pair represented by 2 bilobed staminodes inserted on the corolla-throat, one of the lobes glandular; anthers connivent, the cells divaricate. Ovary 2-celled; ovules many in each cell; style slender; stigma 2-lamellate. Capsule septicidal; valves entire, separating from the placentiferous septum. Seeds many, rugose.—Distrib. N. and S. America, S. Africa, India; species 8.

Corolla 3–4 times as long as the calyx	1. *I. hyssopioides.*
Corolla twice as long as the calyx	2. *I. parviflora.*

1. **Ilysanthes hyssopioides,** *Benth. in DC. Prodr.* v. 10 (1846) p. 419. Stem erect, 3–18 in. high, slender, glabrous, simple or diffusely branched; branches angled and striate. Leaves in distant pairs, sessile, $\frac{1}{4}$–$\frac{3}{4}$ by $\frac{1}{8}$–$\frac{1}{4}$ in., rather thick, obtuse, 1–3-nerved, usually entire; the lower leaves oblong or oblong-lanceolate; the upper smaller, linear. Flowers solitary, axillary; pedicels $\frac{1}{2}$–1 in. long, filiform, deflexed in fruit. Calyx $\frac{1}{10}$ in. long, divided almost to the base; segments linear-lanceolate, acute, glabrous. Corolla $\frac{1}{3}$–$\frac{1}{2}$ in. long (3–4 times as long as the calyx), pale-blue or nearly white, often with dark purple markings. Capsules nearly $\frac{1}{4}$ in. long, oblong, acute, glabrous. Seeds minute. Fl. B. I. v. 4, p. 283; Dalz. & Gibs. p. 179; Trim. Fl. Ceyl. v. 3, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174. *Bonnaya hyssopioides*, Benth. in Wall. Cat. 3866; Grah. Cat. p. 143; Wight, Icon. t. 857.—Flowers: Oct.–Nov.

Konkan: *Stocks!*; Matheran, *Woodrow*. Deccan: Sinhagad near Poona, *Bhiva!*; Mahableshwar, *Woodrow*. S. M. Country: Belgaum, *Cooke!* Gujarat: *Woodrow*, *Kanitkar!*—Distrib. India (Silhet, Khasia mountains, W. Peninsula); Ceylon, China.

2. **Ilysanthes parviflora,** *Benth. in DC. Prodr.* v. 10 (1846) p. 419. Stem erect, branched. Leaves $\frac{1}{2}$–1 by $\frac{1}{4}$–$\frac{1}{2}$ in., sessile or the lower sometimes attenuated into a short petiole, oblong or oblong-lanceolate, obtuse, usually entire, 1–5-nerved. Flowers axillary and in terminal racemes; pedicels $\frac{1}{4}$–$\frac{3}{4}$ in. long, filiform. Calyx $\frac{1}{10}$–$\frac{1}{8}$ in. long, divided almost to the base; segments linear-lanceolate, acute. Corolla $\frac{1}{5}$–$\frac{1}{4}$ in. long (twice as long the calyx), bluish or nearly white. Capsules ovoid-oblong, acute, $\frac{1}{8}$ in. long. Seeds minute. Fl. B. I. v. 4, p. 283;

Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174. *Bonnaya parviflora*, Benth. in Wall. Cat. 3867; Grah. Cat. p. 143.—Flowers: Aug.

Very close to *I. hyssopioides*, from which the smaller corolla and usually shorter pedicels and capsules distinguish it.

KONKAN: *Stocks*!; near Kalyan, *Bhiva*!; Neral, *Woodrow*. S. M. COUNTRY: Belgaum, *Woodrow*.—DISTRIB. More or less throughout India; Siam, Tropical Africa.

15. **BONNAYA,** Link & Otto.

Annual glabrous herbs. Leaves opposite, entire or serrate, obscurely penninerved. Flowers solitary, axillary, or often passing into terminal racemes; bracteoles 0. Calyx 5-partite; segments narrow, hardly imbricate. Corolla 2-lipped; tube cylindric; upper lip erect, broad, concave or 2-fid; lower lip larger, 3-lobed, spreading. Stamens: the 2 upper only perfect, subincluded, with filiform filaments; the 2 lower reduced to 2 obtuse glandular staminodes; anthers of the perfect stamens connivent, the cells divaricate. Ovary 2-celled; ovules many in each cell; style slender; stigma 2-lamellate. Capsule narrow, much exserted, septicidal; valves entire, separating from the placentiferous dissepiment. Seeds many, rugose.—DISTRIB. Warmer regions of the Old World; species 8.

Leaves sharply, deeply and closely serrate, broad.	
Erect, diffusely branched; leaves sessile; corolla ¼ in. long	1. *B. brachiata.*
Prostrate, creeping; leaves petiolate; corolla exceeding ½ in. long	2. *B. reptans.*
Leaves shallowly and distantly serrate, the lower sometimes subentire.	
Stems decumbent or creeping	3. *B. veronicæfolia.*
Stems erect; a small plant	4. *B. oppositifolia.*

1. **Bonnaya brachiata,** *Link & Otto, Icon. Pl. Select.* v. 1 (1820) p. 25, t. 11. Erect, diffusely branched, 3–10 in. high; branches glabrous. Leaves sessile, ½–1¼ by ¼–½ in., oblong, obtuse or subacute, closely and strongly spinous-serrate, glabrous. Flowers in lax terminal racemes; bracts at the base of the pedicels ⅛–⅕ in. long, linear-subulate; pedicels ⅛–¼ in. long. Calyx ⅕ in. long, divided almost to the base; segments linear-subulate, finely aristate. Corolla ¼ in. long, pink. Staminodes short, pubescent. Capsules ½ in. long, narrowly oblong, acute, glabrous. Seeds about $\frac{1}{50}$ in. long, usually truncate at both ends. Fl. B. I. v. 4, p. 284; Grah. Cat. p. 143; Dalz. & Gibs. p. 178; Trim. Fl. Ceyl. v. 3, p. 253; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: Sept.–Nov.

Pasture-lands in the rains, *Graham, Dalzell & Gibson*. KONKAN: *Law*!: near Jambalpada, *Kanitkar*!; Mazgaon near Savantvádi, *Kanitkar*! GUJARAT: Godra, *Woodrow*.—DISTRIB. Throughout India; Ceylon, Java, China, Philippine Islands.

2. **Bonnaya reptans,** *Spreng. Syst. Veg.* v. 1 (1825) p. 41. Prostrate, creeping and rooting at the nodes; branches often 1 ft. long. Leaves distant, ¾–1½ by ½–¾ in., elliptic-oblong or obovate-oblong, rounded at the apex, sharply closely and deeply serrate, base narrowed into a petiole of variable length. Flowers in axillary and terminal racemes; pedicels ¼–½ in. long, spreading; bracts beneath the pedicels ¼ in. long, linear-subulate. Calyx ⅓ in. long, deeply divided; segments ¼ in. long,

linear-lanceolate, acute. Corolla exceeding $\frac{1}{2}$ in. long, light-purple. Capsules $\frac{1}{2}$–1 in. long, very slender. Seeds about $\frac{1}{10}$ in. long, yellow. Fl. B. I. v. 4, p. 284; Dalz. & Gibs. p. 179; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.

KONKAN: S. Konkan: *Dalzell & Gibson, Woodrow.*—DISTRIB. India (E. Bengal, Sikkim, Assam, Cachar, Madras, W. Peninsula); Java, Philippines.

3. **Bonnaya veronicæfolia,** *Spreng. Syst. Veg.* v. 1 (1825) p. 41. Stems decumbent or creeping at the base, often rooting at the nodes; branches ascending, more or less quadrangular. Leaves $\frac{1}{2}$–$1\frac{1}{4}$ by $\frac{1}{5}$–$\frac{1}{2}$ in., subsessile, or the lower sometimes narrowed into a short petiole, oblong, acute, shallowly and distantly serrate, the lower leaves sometimes subentire. Flowers in terminal and axillary racemes; pedicels $\frac{1}{4}$–$\frac{5}{8}$ in. long, divaricate, elongating in fruit; bracts beneath the pedicels linear-lanceolate. Calyx $\frac{1}{5}$ in. long, deeply divided; segments $\frac{1}{6}$ in. long, linear-lanceolate, acute. Corolla $\frac{3}{8}$ in. long, violet, the upper lip streaked with darker violet lines. Stamens: the 2 perfect ones with white anthers; staminodes long, exserted, clavate, yellow. Capsules $\frac{3}{8}$–$\frac{1}{2}$ in. long, narrowly oblong, acute, glabrous. Seeds $\frac{1}{10}$ in. long, usually truncate at both ends. Fl. B. I. v. 4, p. 285; Grah. Cat. p. 143; Dalz. & Gibs. p. 178; Wight, Icon. t. 1411; Trim. Fl. Ceyl. v. 3, p. 253; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—VERN. *Shewál.*

Common, *Dalzell & Gibson.* KONKAN: *Stocks!* DECCAN: moist places, *Woodrow!*; bed of the Yenna, Mahableshwar, *Graham*; Mahableshwar, *H. M. Birdwood.*—DISTRIB. Throughout India; Ceylon, Java, Siam, China, Philippine Islands.

VAR. 1. *grandiflora,* Hook. f. Fl. B. I. v. 4 (1884) p. 285. Branches short, stout. Leaves narrowly obovate. Flowers chiefly axillary; corolla $\frac{1}{4}$ in. long, light-blue (*Roxb.*). Capsules scarcely twice as long as the calyx. *Bonnaya grandiflora* (sp.); Spreng. Syst. Veg. v. 1 (1825) p. 41; Grah. Cat. p. 143; Dalz. & Gibs. p. 179. *Gratiola grandiflora,* Roxb. Cor. Pl. v. 2, p. 42, t. 179.

S. KONKAN: *Dalzell & Gibson.*

VAR. 2. *verbenæfolia,* Hook. f. in Fl. B. I. v. 4 (1884) p. 285. Branches usually long and slender. Leaves narrower, subsessile, entire or distantly serrate. Flowers larger, in often elongate naked racemes. *Bonnaya verbenæfolia* (sp.), Spreng. Syst. Veg. v. 1 (1825) p. 42; Grah. Cat. p. 143; Dalz. & Gibs. p. 178; Wight, Icon. t. 1412.

S. KONKAN: *Dalzell & Gibson.*

4. **Bonnaya oppositifolia,** *Spreng. Syst. Veg.* v. 1 (1825) p. 41. A small, erect, usually branched annual $1\frac{1}{2}$–5 (rarely 6) in. high; branches quadrangular, glabrous. Leaves sessile, $\frac{3}{4}$–$1\frac{1}{4}$ by $\frac{1}{10}$–$\frac{1}{6}$ in., linear-oblong, obtuse or subacute, slightly serrate. Flowers axillary or the upper in racemes; bracts beneath the pedicels $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear-subulate; pedicels $\frac{1}{8}$–$\frac{1}{4}$ in. long. Calyx $\frac{1}{6}$ in. long; segments $\frac{1}{8}$ in. long, linear-lanceolate. Corolla $\frac{1}{4}$ in. long, blue (*Roxb.*). Capsules $\frac{1}{3}$ in. long. Seeds minute. Fl. B. I. v. 4, p. 286; Grah. Cat. p. 143; Dalz. & Gibs. p. 179; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. *Gratiola oppositifolia,* Roxb. Cor. Pl. v. 2 (1798) p. 30, t. 155.—Flowers: Sept.

KONKAN: *Dalzell & Gibson*; Kalyan, *Woodrow.*—DISTRIB. India (W. Peninsula).

16. **PEPLIDIUM,** Delile.

Small prostrate or creeping branched glabrous herbs. Leaves opposite, obovate or spathulate, fleshy, entire. Flowers small, axillary, 1–3-nate, subsessile or shortly pedicellate. Calyx tubular, 5-ribbed, obtusely 5-toothed, enlarged and ovoid-globose in fruit, the ribs almost disappearing. Corolla-tube short; lobes 5, broad, subequal or one broader. Stamens 2, included; filaments curved; anthers 1-celled. Staminodes 0. Ovary 2-celled; ovules many in each cell; stigma large, flat, tongue-shaped, curved. Capsule globose or broadly ovoid. Seeds numerous, small.—DISTRIB. Species 2, an endemic Australian one and the following.

1. **Peplidium humifusum,** *Delile, Descrip. de l'Egypte* (1812) p. 148, t. 4. Stems prostrate, 4–8 in. long, slender, rooting at the nodes, sometimes submerged or floating, flexuose, much-branched. Leaves $\frac{1}{4}$–$\frac{1}{2}$ by $\frac{1}{8}$–$\frac{1}{4}$ in., obovate, rounded at the apex, fleshy, minutely punctate, base tapering into a short often obscure petiole which is connected by a membrane with the petiole of the opposite leaf. Flowers small, 1–3 in the axils of the leaves; pedicels very short, sometimes almost 0. Calyx $\frac{1}{10}$ in. long, thinly membranous, 5-ribbed and reticulately veined; teeth 5, very short, obtuse. Corolla pinkish-white; tube included in the calyx; lobes appearing above it. Capsules globose, $\frac{1}{8}$ in. in diam., almost enclosed in the enlarged calyx, membranous, bursting irregularly. Seeds scarcely $\frac{1}{30}$ in. long, oblong, usually truncate at both ends. Fl. B. I. v. 4, p. 287; Grah. Cat. p. 142; Trim. Fl. Ceyl. v. 3, p. 255; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. *Microcarpæa cochlearifolia,* Sm. in Rees, Cyclop. v. 23, n. 2; Wight, in Hook. Bot. Misc. v. 3 (1833) p. 95, Suppl. t. 29.—Flowers: Dec.

Margin of tanks, *Graham.* KONKAN: Dharamtar (Kolaba district), *Woodrow*; Marmagão, *Woodrow.* SIND: Bubak, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon, Kurdistan, Egypt, Australia.

17. **GLOSSOSTIGMA,** Arn.

Minute glabrous creeping herbs. Leaves opposite or fascicled, linear or spathulate, entire. Flowers minute, axillary, solitary; bracteoles 0. Calyx campanulate, obtusely 3–4-lobed. Corolla shortly tubular; lobes 5, subequal, spreading. Stamens 2 (in the only Indian species) or 4; filaments filiform; anther-cells diverging, their tips confluent. Ovary perfectly or imperfectly 2-celled; ovules many in each cell; style short; stigma dilated, spathulate, recurved. Capsule included in the calyx, loculicidal; valves separating from a columnar placentiferous axis. Seeds small, ellipsoid.—DISTRIB. Species 3, all Australian, one of them widely dispersed through Tropical Asia and Africa.

1. **Glossostigma spathulatum,** *Wight & Arn. in Arn. Pugill. in Nov. Act. Nat. Cur.* v. 18 (1836) p. 355. A small tufted creeping and rooting herb. Leaves $\frac{1}{10}$–$\frac{1}{4}$ by $\frac{1}{5}$–$\frac{1}{8}$ in., narrowly spathulate, running down into a flat petiole of variable length (sometimes reaching $\frac{1}{2}$ in. long) which appears like the continuation of the leaf-blade. Flowers axillary, solitary; pedicels slender, variable in length, $\frac{1}{6}$–$\frac{1}{2}$ in. long or more. Calyx campanulate, $\frac{1}{12}$ in. long; lobes 3, shallow, broadly ovate-

deltoid, subobtuse. Corolla blue (*Hooker*); tube included in the calyx; lobes of the limb appearing above it. Stamens 2. Capsules scarcely $\frac{1}{10}$ in. in diam., enclosed in the slightly enlarged calyx. Seeds $\frac{1}{40}$ in. long, ellipsoid. Fl. B. I. v. 4, p. 288; Dalz. & Gibs. p. 180; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. *Microcarpæa spathulata*, Hook. Bot. Misc. v. 2 (1831) p. 101, Suppl. t. 4; Grah. Cat. p. 142.—Flowers: Nov.

Margins of tanks and other moist places, *Graham*, *Dalzell & Gibson*. KONKAN: Malwán, *Woodrow*.—DISTRIB. India (Upper Gangetic plain, Behar, W. Peninsula); Tropical Africa and Australia.

18. **CAMPYLANTHUS,** Roth.

Shrubs. Leaves alternate, linear, subfleshy, entire. Flowers in terminal racemes often secund; pedicels with 2 bracts near the base. Calyx deeply 5-fid or 5-partite; segments imbricate. Corolla-tube elongate, slender, incurved; lobes 5, orbicular or ovate, spreading, subequal, imbricate, the lateral exterior in bud. Stamens 2, included; filaments short; anther-cells divaricate, their tips confluent. Ovary 2-celled; ovules many in each cell; style short or long, straight or inflexed; stigma capitate. Capsule orbicular or broadly ovoid, compressed, septicidal; valves 2-fid or 2-partite. Seeds numerous, orbicular, compressed, notched at the hilum; funicle more or less expanded into a hyaline wing which sometimes surrounds the entire seed.—DISTRIB. Canary and Cape de Verde Islands, Arabia, Sind, Beluchistan; species 4.

1. **Campylanthus ramosissimus,** *Wight*, *Icon.* v. 4 (1850) t. 1416. A low much-branched shrub; branches slender, stiff, divaricate, spinescent. Leaves $\frac{1}{4}$–$\frac{1}{2}$ in. long, somewhat fleshy, linear-oblong or spathulate, obtuse, villous. Flowers in subcorymbose terminal few-flowered racemes; pedicels usually shorter than the calyx; bracts at the base of the pedicels broadly lanceolate, acute, scarcely $\frac{1}{20}$ in. long. Calyx $\frac{1}{8}$–$\frac{1}{6}$ in. long, narrowly campanulate, 5-partite almost to the base; segments lanceolate, acute. Corolla $\frac{1}{2}$ in. long; tube $\frac{3}{8}$ in. long, curved; lobes ovate, acute, veined. Capsules $\frac{1}{5}$ in. in diam., orbicular, compressed, glabrous; valves 2-partite. Seeds not seen. Fl. B. I. v. 4, p. 290; Aitch. Pb. & Sind Pl. p. 108; Boiss. Fl. Orient. v. 4, p. 433; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: Nov.–Jan.

SIND: limestone range near Hydrabad, *Stocks*!; Jungadi, *Woodrow*; hills of Sind, *Stocks*, 522!—DISTRIB. Beluchistan.

19. **VERONICA,** Linn.

Herbs or shrubs, rarely trees. Leaves opposite, the cauline or all rarely alternate. Flowers solitary, axillary, or in terminal or axillary racemes; bracts usually conspicuous; bracteoles 0. Calyx 4–5-partite; lower segments connate; the uppermost, if present, smaller. Corolla rotate or shortly hypocrateriform; lobes spreading, the lateral or one of them outermost in bud, the upper and lower lobes usually narrowest. Stamens 2, adnate to the corolla-tube by the sides of the upper lobe, exserted; anther-cells parallel or not, obtuse, their tips confluent. Ovary 2-celled; ovules in each cell many or few, rarely only 2; style simple; stigma subcapitate. Capsule 2-grooved, compressed or turgid; dehiscence

various. Seeds many or few, ovoid or globose, plano-concave or boat-shaped, rugulose or smooth, sometimes winged.—DISTRIB. Throughout the temperate and cold regions of both hemispheres, few in the Tropics, not numerous in America; species more than 200.

1. **Veronica Anagallis,** *Linn. Sp. Pl.* (1753) p. 12. An erect succulent usually glabrous herb 3–18 in. high. Leaves sessile and ½-amplexicaul or the lowest petiolate, 1¼–5 by ¼–¾ in., oblong or oblong-lanceolate, obtuse or subacute, entire or more or less serrate, glabrous, base usually cordate. Flowers in axillary lax slender racemes 3–6 in. long; bracts beneath the pedicels linear-lanceolate, acute, 1/10–⅛ in. long; pedicels ⅛–¼ in. long, filiform. Calyx 1/16–⅛ in. long, divided to the base; sepals ovate, subacute. Corolla ⅛–¼ in. across, pink or white; tube very short. Capsules compressed, orbicular-oblong, ⅛–⅙ in. long, emarginate, glabrous. Seeds ellipsoid-oblong, 1/40 in. long, biconvex. Fl. B. I. v. 4, p. 293; Boiss. Fl. Orient. v. 4, p. 437; Reichb. Icon. Germ. t. 1702; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: Nov.–Jan.

KONKAN: *Stocks*! DECCAN: *Woodrow*; Ambarkhind near Bhore, *Kanitkar*!; Khair in watercourses, *Nairne*.—DISTRIB. India (Panjáb, Kashmir, Bhotan, Bengal, Assam, W. Peninsula); Europe, N. Asia, S. Africa, N. America.

20. BUCHNERA, Linn.

Annual rigid herbs, black when dry. Leaves: lower opposite, broad; upper alternate, narrow. Flowers sessile, axillary or in bracteate spikes, 2-bracteolate. Calyx tubular, 5-toothed, 10-nerved, sometimes 5-ribbed. Corolla-tube slender; lobes 5, flat, subequal, spreading, the upper inmost in bud. Stamens 4, didynamous, included; anthers 1-celled, vertical, dorsifixed, the bases obtuse, the connective sometimes mucronate. Ovary 2-celled; ovules many in each cell; style thickened or clavate upwards; stigma entire or notched. Capsule oblong, loculicidal; valves entire, coriaceous, septiferous, separating from the placentas. Seeds very many, obovoid or oblong, reticulated.—DISTRIB. Throughout the warmer regions of both hemispheres; species about 75.

1. **Buchnera hispida,** *Buch.-Ham. in D. Don, Prodr. Fl. Nep.* (1825) p. 91. An erect herb 6–20 in. high; stem slender (sometimes very slender), hairy, sometimes, but not commonly, branched above. Leaves sessile or narrowed into a more or less obscure petiole, toothed or entire; the lower crowded, obovate or oblong, 1–2 by ⅓–1 in.; the upper narrower, linear-lanceolate, passing into alternate narrow floral bracts. Flowers distant, sessile in the axils of linear acute floral bracts, arranged in terminal spikes 6–10 in. long; bracteoles 1/12–1/10 in. long, subulate, hispid. Calyx ⅛–¼ in. long, tubular, hispid; teeth 1/16 in. long, lanceolate, acute. Corolla light-purple; tube nearly ⅓ in. long, slender, hairy inside; lobes about ⅛ in. long, obovate, obtuse. Capsules oblong, shorter than the calyx. Seeds about 1/30 in. long, irregularly cuneate-oblong, usually more or less truncate at one end, rounded at the other. Fl. B. I. v. 4, p. 298; Dalz. & Gibs. p. 182; Wight, Icon. t. 1413; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.

KONKAN: *Stocks*!, *Dalzell*!; Island of Karanja, *Dalzell & Gibson*. DECCAN: Khandala, *Cooke*!; Kirkee, *Woodrow*; Koina valley below Mahableshwar, *Cooke*!; Tale-

gaon, on Railway line, *Bhiva*! S. M. Country: Belgaum, *Kanitkar*!—Distrib. India (Western and Central Himalaya, Central India, W. Peninsula); Madagascar, Tropical Africa.

21. **STRIGA,** Lour.

Herbs usually scabrid, discolored or black when dry. Leaves: the lower opposite, the upper alternate, linear, entire, rarely toothed, sometimes reduced to scales. Flowers axillary, or the upper in bracteate spikes; bracteoles usually 2. Calyx tubular, 4- or 5- or 10- or 15-ribbed, 5 (rarely 4) -toothed or -fid. Corolla 2-lipped; tube slender, abruptly incurved at or above the middle; limb spreading, the upper lip inner in bud, usually short, notched or 2-fid, the lower lip 3-lobed. Stamens 4, didynamous, included; anthers 1-celled, vertical, dorsifixed, bases obtuse, the connective sometimes mucronate. Capsule subglobose or oblong, loculicidal; valves entire, septiferous, separating from the placentas. Seeds numerous, ovoid or oblong, usually reticulated.—Distrib. Warmer regions of Asia, Africa, and Australia; species about 30.

Calyx 4-5-ribbed, 1 rib running to the apex of each calyx-tooth.
- Usually parasitic on roots; whole plant reddish-brown; root tuberous; leaves scale-like; corolla pink ..... 1. *S. orobanchioides.*
- Not parasitic; whole plant green; root not tuberous; leaves linear; corolla white ..... 2. *S. densiflora.*

Calyx 10–15-ribbed.
- Ribs of the calyx most commonly 10; the secondary ribs ending at the sinus; flowers yellow ..... 3. *S. lutea.*
- Ribs of the calyx 15, the secondary ribs continued up the sides of the adjacent calyx-teeth, not ending at the sinus.
  - Calyx $\frac{1}{3}$ in. long; corolla white, the tube exserted ..... 4. *S. euphrasioides.*
  - Calyx $\frac{1}{2}$ in. long or more; corolla yellow, the tube not exserted ..... 5. *S. sulphurea.*

1. **Striga orobanchioides,** *Benth. in Hook. Comp. Bot. Mag.* v. 1 (1835) p. 361, t. 19. A small erect glabrous or puberulous herb 6–12 in. high, parasitic on roots or growing on rocks. Stems many from a tuberous root, simple or branched, dark reddish-purple. Leaves scale-like, ovate-oblong, acute, dark reddish-purple like the stems, passing into floral bracts. Flowers numerous, sessile, erect, in erect usually densely flowered terminal spikes; floral bracts ovate-lanceolate, acute, a little shorter than the calyx; bracteoles rather more than $\frac{1}{2}$ as long as the calyx, linear-lanceolate, acute, ciliolate. Calyx exceeding $\frac{1}{4}$ in. long, 5- or 4-ribbed; teeth 5 or 4, about $\frac{1}{3}$ as long as the tube, narrowly lanceolate, very acute, bristle-tipped. Corolla 2-lipped, pink, with a white spot at the base of each of its lobes; tube reaching $\frac{1}{2}$ in. long, incurved above the middle, with hairs in the throat; limb about $\frac{1}{4}$ in. across, the upper lip deeply divided, the lobes obovate-oblong, rounded, the lower lip 3-lobed to about $\frac{1}{2}$-way down, the lobes obtuse. Capsules oblong-ellipsoid, $\frac{1}{4}$ in. long, tipped with the base of the style. Seeds oblong, $\frac{1}{40}$ in. long. Fl. B. I. v. 4, p. 299; Dalz. & Gibs. p. 181; Wight, Icon. t. 1414; Aitch. Pb. & Sind Pl. p. 108; Trim. Fl. Ceyl. v. 3, p. 255; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. *Striga coccinea,* Grah. Cat. p. 145 (*not* of Benth.).—Flowers: Oct.–Nov. Vern. *Támbdi kari-cha gavat.*

Konkan: *Law*!, *Stocks*!; *Dalzell & Gibson*; Matheran, *Woodrow.* Deccan: hilly

parts, *Dalzell*!; on rocks near Mahableshwar, *Woodrow*!; Mahableshwar, common, *Cooke*!; Fitzgerald Ghát, below Mahableshwar, *Cooke*!; Poona, *Woodrow*. GUJARAT: Dakor, *Woodrow*.—DISTRIB. India (W. Peninsula); Ceylon, Tropical and S. Africa, Arabia.

I have always found the plant (which is very common at Mahableshwar) with dark reddish-purple stems and pink flowers, and this seems to be its usual character. Trimen (Fl. Ceyl. l. c.) says that it is sometimes green and then has white flowers.—The plant dries black.

2. **Striga densiflora**, *Benth. in Hook. Comp. Bot. Mag.* v. 1 (1835) p. 363. An erect scabrid or strigose herb 6–18 in. high. Stem slender, subquadrangular, harshly strigose, simple or branched; root not tuberous. Leaves sessile, ½–1½ by $\frac{1}{16}$–⅙ in., linear, acute, erect, passing into floral bracts. Flowers in slender spikes in the axils of floral bracts which are longer than the calyx; bracteoles 2, linear, acute, ciliate, about ⅔ the length of the calyx. Calyx ⅕–¼ in. long, 5-ribbed; teeth slightly shorter than the tube, lanceolate-subulate, hairy, ciliate. Corolla white; tube nearly ⅓ in. long with hairs in the throat, incurved above the middle; limb ¼ in. or more across, the upper lip much shorter than the lower, 2-fid, the lower lip deeply 3-lobed, the lobes oblong, obtuse. Capsules included in the calyx, ⅙ in. long, oblong-obovoid, rounded at the apex, tipped with the style-base. Seeds minute. Fl. B. I. v. 4, p. 299; Dalz. & Gibs. p. 181; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: Aug.–Nov.

KONKAN: *Stocks*! DECCAN: Bowdhán near Poona, *Woodrow*!; Khandala, *Cooke*!; Koina valley below Mahableshwar, *Cooke*! GUJARAT: Surat, *Dalzell*!—DISTRIB. More or less throughout India.

3. **Striga lutea**, *Lour. Fl. Cochinch.* (1790) p. 22. Stems 3–12 in. high, erect, rigid, slender, simple or branched, strigose with prickly hairs. Leaves sessile, ½–1¼ in. long, linear, often rough with pustular prickles. Flowers in long, lax spikes; bracts usually longer than the calyx; bracteoles $\frac{1}{10}$ in. long, linear-subulate, strigose. Calyx ⅕ in. long, narrowly tubular in flower, widening in fruit, with 1 strong hirsute rib running from the base of the calyx to the apex of each tooth and with 1 (less commonly 2) secondary ribs between them which terminate at the sinus; teeth $\frac{1}{16}$ in. long, lanceolate-subulate, rigid, bristle-tipped. Corolla usually bright yellow, occasionally red or white (varying in size with that of the plant), in well-grown specimens ¼ in. across; tube ⅜ in. long, pubescent or glabrous outside, much incurved at top beneath the limb; upper lip not half as long as the lower, broad, scarcely emarginate; lower lip deeply 3-lobed, the lobes obovate-oblong, obtuse. Capsules ⅕ in. long, oblong-ellipsoid. Seeds minute, irregular. Fl. B. I. v. 4, p. 299; Trim. Fl. Ceyl. v. 3, p. 256; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. *Striga hirsuta*, Benth. in DC. Prodr. v. 10, p. 502; Dalz. & Gibs. p. 181; Aitch. Pb. & Sind Pl. p. 108.—Flowers: Nov.–Jan.

KONKAN: *Stocks*! DECCAN: Karli, *Kanitkar*!; Khandala, *Bhiva*!, *Graham*. S.M. COUNTRY: Castlerock, *Cooke*!; Badami, *Cooke*!, *Woodrow*! SIND: *Stocks*!—DISTRIB. India (Bengal, Panjáb, Tenasserim, W. Peninsula); Ceylon, Siam, Java, China, Arabia, Tropical and S. Africa, Madagascar.

4. **Striga euphrasioides**, *Benth. in Comp. Bot. Mag.* v. 1 (1835) p. 364. A plant of very variable habit, sometimes 4–6 in. high, with filiform simple stem, sometimes a much-branched stout herb reaching

2 ft. high. Leaves linear, 1–2 by $\frac{1}{12}$–$\frac{1}{8}$ in., sometimes with 1 or 2 teeth on each margin, sessile, scabrous. Flowers sessile or shortly pedicellate, in long, often interrupted, lax erect spikes or racemes; bracts shorter or longer than the calyx; bracteoles $\frac{1}{10}$ in. long, subulate. Calyx $\frac{1}{3}$ in. long, campanulate, with 15 strong scabrous ribs, 1 rib running from the base of the calyx to the apex of and along the middle of each tooth, with 2 secondary ribs between not ending at the sinus, but extending respectively up the sides of the opposite calyx-teeth, which are thus strongly margined; calyx-teeth nearly equalling the tube, linear-subulate, very acute, usually reflexed in fruit. Corolla exceeding $\frac{1}{2}$ in. long, white; tube exserted, exceeding $\frac{3}{8}$ in. long, pubescent in the upper part, much incurved beneath the limb; upper lip much shorter than the lower. Capsules $\frac{1}{4}$ in. long, oblong-ellipsoid, the top of the valves reflexed after dehiscence. Seeds scarcely $\frac{1}{30}$ in. long, cuneate-oblong, usually truncate at one end. Fl. B. I. v. 4, p. 299; Grah. Cat. p. 145; Dalz. & Gibs. p. 181; Trim. Fl. Ceyl. v. 3, p. 256. *Buchnera euphrasioides*, Vahl, Symb. v. 3 (1794) p. 81; Wight, Icon. t. 855.

KONKAN: *Stocks*!, *Dalzell.*—DISTRIB. More or less throughout India; Ceylon, Java.

5. **Striga sulphurea,** *Dalz. & Gibs. Bo. Fl.* (1861) p. 182. An erect scabrous slender herb; stems scarcely branched, 4-angled. Leaves sessile, $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{25}$–$\frac{1}{16}$ in., linear, acute, scabrous, often with 1 or 2 small teeth on each margin. Flowers mostly axillary, subsessile or very shortly pedicellate; bracteoles small, subulate. Calyx $\frac{1}{2}$ in. long or more, divided to the middle, with 15 prominent strong scabrous ribs as in *Striga euphrasioides*; calyx-teeth exactly linear, strap-shaped. Corolla yellow; tube as long as the calyx, pubescent towards the top; upper lip broad, almost truncate; lower lip 3-lobed, the lobes obovate, ciliolate, $\frac{1}{12}$–$\frac{1}{10}$ in. long. Capsules rather less than $\frac{1}{4}$ in. long, oblong. Seeds about $\frac{1}{40}$ in. long, cuneate-oblong, usually truncate at one end. Fl. B. I. v. 4, p. 300.

Rare. KONKAN: *Stocks*!; Shivnar hill-fort on wet rocks, *Dalzell & Gibson, Dalzell*! DECCAN: Ghâts, *Stocks*!—DISTRIB. India (W. Peninsula).

22. **RHAMPHICARPA,** Benth.

Erect branched glabrous herbs drying black. Lower leaves opposite, the upper alternate, narrow, entire or pinnatisect. Flowers axillary, pedicellate, or in bracteate racemes; bracteoles 1–2 or 0. Calyx campanulate or tubular-campanulate, 5-fid; lobes acuminate. Corolla-tube slender, elongate, straight or incurved; lobes 5, broad, spreading, subequal or the upper connate. Stamens 4, didynamous, included in the tube; anthers 1-celled, vertical, dorsifixed, bases obtuse. Ovary 2-celled; ovules many in each cell; style thickened or clavate above; stigma simple. Capsule compressed at right angles to the septum, usually beaked, loculicidal; valves septiferous. Seeds numerous, small, obovoid or oblong; testa reticulate.—DISTRIB. Tropical and S. Africa, India, and Australia; species 10 or 12.

1. **Rhamphicarpa longiflora,** *Benth. in DC. Prodr.* v. 10 (1846) p. 504. An erect glabrous herb very variable in height and habit, 2–12 in. high; stem simple, or often, in large plants, much-branched.

Leaves 1–1½ in. long, pinnatisect, with filiform segments. Flowers axillary, shortly pedicellate. Calyx ¼ in. long; tube about $\frac{1}{16}$ in. long; lobes lanceolate, produced into a long subulate acumen. Corolla white; tube 1–1½ in. long, very slender, straight; limb ½–⅔ in. across, the lobes obovate-oblong, obtuse, emarginate. Capsules ½ in. long (including the oblique or incurved beak), ovoid. Seeds about $\frac{1}{30}$ in. long, oblong. Fl. B. I. v. 4, p. 300; Grah. Cat. p. 145; Dalz. & Gibs. p. 182; Wight, Icon. t. 1415; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: Oct.–Nov.

KONKAN: *Stocks*!, *Graham*; Máhar, *Dalzell*!; Malwán, *Woodrow*; Matheran, *H. M. Birdwood*. DECCAN: Khandala, *Kanitkar*!, *Cooke*!; Wada below Mahableshwar, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 529!, *Cooke*!, *Law* ex *Graham*.—DISTRIB. India (W. Peninsula).

23. **SOPUBIA,** Buch.-Ham.

Erect herbs. Leaves opposite or the upper alternate, narrow, often laciniate. Flowers spicate or racemose; bracts leafy; bracteoles 2. Calyx campanulate; lobes 5, narrow. Corolla infundibuliform; tube short, the throat dilated; lobes 5, broad, spreading, subequal, the 2 upper inmost in bud. Stamens 4, didynamous; anthers of upper or both pairs of stamens in contact by pairs, one cell of each stamen perfect, ovoid, the other empty and stipitate. Ovary 2-celled; ovules many in each cell; style simple; stigma thickened, sublinguiform, obtuse. Capsule ovoid or oblong, rounded or compressed, retuse or notched, loculicidal; valves entire or 2-fid, separating from the placentiferous dissepiment. Seeds numerous; testa somewhat lax.—DISTRIB. Africa, Madagascar, India, Malaya, Australia; species about 20.

Calyx-teeth filiform, longer than the calyx-tube; corolla purple.	1. *S. delphinifolia.*
Calyx-teeth deltoid-ovate, equalling the calyx-tube; corolla yellow	2. *S. trifida.*

1. **Sopubia delphinifolia,** *G. Don, Gen. Syst.* v. 4 (1837) p. 560. Stem 1–3 ft. high, erect, subquadrangular, grooved, much-branched, pubescent or glabrous, often spotted with purple. Leaves opposite, 1–1½ in. long, pinnatisect; segments few, long, filiform, distant, spreading, flexuous, often ciliate with minute hairs, the uppermost passing into long simple floral leaves (*bracts*). Flowers numerous, axillary, solitary or in few-flowered terminal racemes; bracteoles on the pedicels a little below the calyx ½ in. long, filiform; pedicels ⅛–¼ in. long, slender. Calyx ¾ in. long, glabrous; tube ¼ in. long, strongly ribbed; teeth long, linear-subulate, erect, ½ in. long. Corolla 1–1½ in. long, rose-colored; limb ¾ in. across, with broad spreading lobes. Filaments hairy. Capsules ¼ in. long, oblong-ellipsoid. Seeds scarcely $\frac{1}{30}$ in. long, cuneate-oblong, striate, usually truncate at one end. Fl. B. I. v. 4, p. 302; Grah. Cat. p. 145; Dalz. & Gibs. p. 182; Trim. Fl. Ceyl. v. 3, p. 257; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175; Watt, Dict. Econ. Prod. v. 6, part 3, p. 277.—Flowers: Aug.–Oct. VERN. *Dudháli.*

Common in cultivated fields at the close of the rains. KONKAN: *Stocks*!, *Law*!; Matheran (Louisa Point), *H. M. Birdwood*; pasture-lands throughout the Konkan, *Graham*. DECCAN: hills N. of Poona, *Ravji*!; Khandala, *Graham*, *Kanitkar*!; Mahableshwar, *Cooke*! GUJARAT: *Woodrow*.—DISTRIB. India (Behar, Chota Nagpur, W. Peninsula); Ceylon.

The juice of the plant is employed by laborers in the Deccan as an astringent to heal sores on the feet caused by exposure to moisture. It stains the skin at first yellow and subsequently black. See Watt, Dict. Econ. Prod. l. c.

2. **Sopubia trifida,** *Buch.-Ham. in Don, Prodr. Fl. Nep.* (1825) p. 88. A slender glabrous or pubescent erect herb 1–2 ft. high; stem furrowed and angular, more or less pubescent, simple or branched. Leaves sessile, ½–1½ in. long, narrowly linear, acute, the upper undivided, alternate, the lower mostly 3-fid, often in whorls of 3, glabrous above, minutely pubescent beneath. Flowers in bracteate terminal racemes; bracts longer or shorter than the pedicels; bracteoles on the pedicels a little below the calyx, alternate, linear-subulate, ⅕ in. long; pedicels ¼–¾ in. long, slender. Calyx campanulate, ¼ in. long, glabrous and slightly ribbed outside, woolly inside, divided ½-way down; teeth 5, deltoid-ovate, acute, with membranous margins. Corolla subrotate, yellow with a purplish eye (*Trimen*), ½ in. across; tube very short; limb spreading, with 5 rounded lobes. Filaments glabrous. Style long, thickened upwards; stigma tongue-shaped. Capsules ellipsoid, scarcely longer than the slightly enlarged calyx, notched at the apex. Seeds $\frac{1}{30}$ in. long, cuneate-oblong, striate. Fl. B. I. v. 4, p. 302; Trim. Fl. Ceyl. v. 3, p. 257; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. —Flowers: Oct.

Rare in the Bombay Presidency. KONKAN; *Stocks!, Law!* DECCAN: Panchgani, *Woodrow.*—DISTRIB. More or less throughout India in hilly districts; Ceylon.

24. LINDENBERGIA, Lehm.

Annual or perennial usually villous herbs, woody below; branches erect, straggling or ascending. Leaves opposite or the upper alternate, toothed. Flowers axillary or passing into terminal spikes or racemes, usually yellow; bracts leafy; bracteoles 0. Calyx campanulate, semi-5-fid. Corolla-tube cylindric; upper lip innermost in bud, broad, emarginate, or 2-lobed; lower lip larger, 3-lobed, spreading, outermost in bud; throat and lip with a 2-plicate palate. Stamens didynamous, included; anthers with separate stalked cells, all fertile. Capsule oblong or ovoid, 2-grooved, loculicidal; valves entire, separating from the placentiferous dissepiment. Seeds numerous, minute.—DISTRIB. East Africa, Arabia, India, and the Malayan Archipelago; species 8.

Bentham in DC. Prodr. v. 10 (1846) p. 340 puts *Lindenbergia* under the section in which the upper lip of the corolla is always exterior in bud, as do also Bentham and Hooker (Gen. Plant. v. 2, p. 919) and C. B. Clarke (Hook. f. Fl. B. I. v. 4, p. 247). This is not the case in the *Lindenbergias* I have examined, in all of which the upper lip was found to be *innermost* in bud.

Calyx-lobes acute; capsule glabrous	1. *L. abyssinica.*
Calyx-lobes obtuse; upper part of capsule pubescent.	
Leaves ¾–2 in. long; petioles moderately long	2. *L. urticæfolia.*
Leaves ½ in. long; petioles very short	3. *L. polyantha.*

1. **Lindenbergia abyssinica,** *Hochst. ex Benth. in DC. Prodr.* v. 10 (1846) p. 377. A viscous-pubescent or pilose herb woody at the base (? perennial); stem 11–18 in. high, divaricately branched. Leaves 1–1½ by ¾–1¼ in., broadly ovate, acute, coarsely crenate-serrate, hairy on both surfaces; petioles ¼–½ in. long. Flowers in lax terminal spikes or

racemes; pedicels 0–$\frac{1}{20}$ in. long. Calyx $\frac{1}{5}$–$\frac{1}{4}$ in. long, hairy; lobes $\frac{1}{12}$ in. long, subtriangular, acute. Corolla $\frac{1}{2}$ in. long, yellow. Capsules scarcely exserted, glabrous. Fl. B. I. v. 4, p. 262.

SIND: *Dalzell*, 81!

There is in Herb. Kew. but 1 sheet containing rather fragmentary specimens of this plant, which were collected by Dalzell among rocks in Sind. The specimens are not sufficient to allow of accurate determination, but the identification seems correct. Additional specimens from Sind would be valuable.—DISTRIB. Arabia (tolerably abundant at Aden), Somali Country, Abyssinia.

2. **Lindenbergia urticæfolia,** *Link & Otto, Icon. Pl. Rar. Hort. Berol.* (1828) t. 48. Annual, 4–20 in. high, brittle when dry, glandular-villous or glabrate; stem simple or branched. Leaves $\frac{3}{4}$–2 by $\frac{1}{2}$–$1\frac{1}{4}$ in., ovate, subacute, crenate-serrate, usually glandular-villous on both sides; petioles $\frac{1}{4}$–1 in. long. Flowers solitary or 2-nate in the axils of large leaves, sometimes running out into axillary or terminal leafy racemes; pedicels short. Calyx $\frac{1}{4}$ in. long, densely glandular-villous, divided about $\frac{1}{3}$ the way down; lobes triangular-oblong, subobtuse, hairy on both sides. Corolla yellow, $\frac{1}{2}$ in. long, more or less hairy outside, 2-lipped; upper lip shortly 2-lobed; lower lip with 3 rounded veined lobes, the mid-lobe narrower than the lateral ones and projecting beyond them, $\frac{1}{20}$–$\frac{1}{16}$ in. long, quadrate-oblong, rounded at the apex, the throat hairy. Ovary ovoid, glabrous when very young, afterwards pubescent near the apex; style $\frac{1}{3}$ in. long, exceeding the stamens, simple, filiform. Capsules oblong, hairy in the upper part, $\frac{1}{5}$ in. long. Seeds minute, $\frac{1}{50}$ in. long, ellipsoid-oblong, smooth or nearly so. Fl. B. I. v. 4, p. 262; Grah. Cat. p. 143; Dalz. & Gibs. p. 176; Hook. Icon. Pl. t. 875; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174; Watt, Dict. Econ. Prod. v. 4, p. 642.—Flowers: Sept.–Nov. VERN. *Dhol.*

KONKAN: Bassein, *Cooke*!; Revadanda, *Gungaram*!; Marmagão, *Woodrow*. GUJARAT: *Kanitkar*!; Surat, *Cooke*!, *Woodrow*!; Baroda, *Woodrow*!—DISTRIB. Throughout India, often on old walls; Afghanistan.

3. **Lindenbergia polyantha,** *Royle, ex Benth. Scroph. Ind.* (1835) p. 22. Annual, densely glandular-villous; stems leafy, 12–20 in. long, often branched from the base. Leaves $\frac{1}{2}$ by $\frac{3}{8}$ in. (rarely larger), numerous, ovate or elliptic, acute, serrate-dentate, softly villous on both sides; petioles very short. Flowers numerous, in densely leafy racemes in the opposite axils of floral leaves (*bracts*) which become smaller upwards; pedicels 0–$\frac{1}{20}$ in. long; bracts exceeding the calyx. Calyx $\frac{1}{4}$ in. long, densely glandular-villous, lobed $\frac{1}{4}$-way down or more; lobes oblong, obtuse. Corolla yellow, $\frac{1}{2}$ in. long, more or less hairy outside, 2-lipped; upper lip shortly 2-lobed, pubescent inside; lower lip with 3 rounded veined lobes, the mid-lobe about $\frac{1}{20}$ in. long, quadrate-oblong, rounded at the apex. Stamens exserted beyond the corolla-tube. Ovary ovoid, usually glabrous; style as long as or sometimes rather shorter than the stamens. Capsules $\frac{1}{4}$ in. long, pubescent at the top, veined. Seeds minute, oblong. Fl. B. I. v. 4, p. 262; Benth. in DC. Prodr. v. 10, p. 377; Aitch. Pb. & Sind Pl. p. 106.

Very close to *L. urticæfolia*, of which it may possibly be a starved form.

DECCAN: Khandesh, *Kanitkar*! SIND: Boogta hills, *Vicary*!—DISTRIB. India (Panjáb, Behar, E. Bengal, W. Peninsula).

25. **CENTRANTHERA,** R. Br.

Annual rigid scabrid herbs. Leaves opposite or the upper alternate, oblong or linear, obtuse, entire or toothed. Flowers axillary or in bracteate spikes or racemes; bracteoles 2. Calyx compressed, spathaceous, split on one side, entire or shortly 3–5-lobed on the other. Corolla-tube long, incurved, dilated above; limb oblique, with 5 broad subequal spreading lobes, the 2 upper inmost in bud. Stamens 4, didynamous, included; anthers meeting in pairs, the cells transverse, bases spurred or mucronate, often one cell sterile. Ovary 2-celled; ovules many in each cell; style simple, dilated above; stigma tongue-shaped, acute. Capsule ovoid or subglobose, loculicidal; valves entire, carrying away the placenta. Seeds many, oblong-cuneate; testa lax, reticulate.—Distrib. Tropical and Subtropical Asia, Malayan Archipelago, and Australia; species 4,

1. **Centranthera hispida,** *R. Br. Prodr.* (1810) p. 438. An erect hispid often hoary herb 3–20 in. high; stem stout, simple or more or less branched above. Leaves variable, ½–1¼ by ⅛–⅜ in., subsessile, linear-oblong or sometimes elliptic-oblong, hispid on both sides with tuberculate hairs. Flowers rather large, subsessile in bracteate spikes; bracts longer or shorter than the calyx; bracteoles ⅙ in. long, linear-lanceolate. Calyx ⅓ in. long, ovoid, acute, densely hispid, split down one side, the other side entire. Corolla infundibuliform, rose-colored or white, ¾ in. long or even more; lobes subequal, rounded. Filaments sparsely clothed with long white hairs; anthers meeting in pairs, the cells spurred, 1 imperfect. Capsules rather more than ¼ in. long, broadly ovoid-oblong, grooved, slightly rugose. Seeds $\frac{1}{25}$ in. long, oblong-cuneate or almost conical, truncate at one end, spirally striate. Fl. B. I. v. 4, p. 301; Grah. Cat. p. 145; Dalz. & Gibs. p. 182; Trim. Fl. Ceyl. v. 3, p. 259; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: Sept.–Oct.

Konkan: Vingorla, *Woodrow*!; Savantvádi, *Kanitkar*!; Malwán, *Woodrow*; Collem below the Castlerock Ghát, *Cooke*!; Matheran, *H. M. Birdwood.* Deccan: Wada below Mahableshwar, *Woodrow*; Koina valley below Mahableshwar, *Cooke*! S. M. Country: Rámghát, *Graham.*—Distrib. Throughout India; Ceylon, Java, China, Philippine Islands, Australia.

26. **PEDICULARIS,** Linn.

Annual or perennial herbs. Leaves alternate, opposite or whorled, pinnatifid or pinnatisect. Flowers in bracteate terminal spikes or racemes; bracteoles 0. Calyx spathaceous, entire or split down one side nearly to the base, 2–5-toothed at the apex. Corolla 2-lipped; tube nearly cylindric; upper lip erect, hooded (*galeate*), laterally compressed, obtuse, acute, or beaked; lower lip with 3 spreading lobes. Stamens 4, didynamous; anthers under the upper lip meeting in pairs, the cells equal, parallel, all perfect. Style long, slender; stigma capitate. Capsule compressed, usually more or less oblique and often beaked, loculicidal. Seeds various, usually numerous.—Distrib. Chiefly in N. temperate regions and mountains, a few in the Tropics in the mountains of S. America and S. India; species about 120.

1. **Pedicularis zeylanica,** *Benth. Scroph. Ind.* (1835) p. 54. Annual, 6–18 in. high; stem erect, simple or branched, leafy, slightly pubescent. Leaves fleshy, 1–1½ by ¼–½ in., oblong-lanceolate, obtuse, cut into 12–20 pairs of obtuse crenate lobes, glabrous above, more or less pubescent beneath, the lower leaves shortly petiolate, the upper sessile. Flowers rather large, in elongate lax erect racemes or spikes; pedicels 0–½ in. long. Calyx ⅓–½ in. long, cleft nearly to the base on one side. Corolla pink; tube ½–⅝ in. long by ⅛ in. broad at the top; upper lip rounded, not beaked; lower lip ⅔ in. in diam., the lobes broad, subacute. Capsules ½–⅝ in. long, obliquely ovoid, acuminate. Seeds black, suborbicular, reticulate, ⅕ in. in diam. Fl. B. I. v. 4, p. 317; Wight, Icon. t. 1419; Prain, Sp. Pedic. in Annal. Roy. Bot. Gard. Calc. v. 3 (1891) p. 153, t. 14; Trim. Fl. Ceyl. v. 3, p. 260.

Rare. KONKAN: hills, *Stocks*!, *Dalzell*! DECCAN: Mahableshwar hills, *H. M. Birdwood*.—DISTRIB. India (W. Peninsula); Ceylon.

The following non-indigenous species not belonging to any of the foregoing genera are (except *Scoparia dulcis*) cultivated as ornamental plants in the Bombay Presidency:—

Antirrhinum majus, Linn. Sp. Pl. (1753) p. 617. A perennial herb, but in India usually cultivated as an annual, a native of the Mediterranean region. The well-known *Snapdragon* of English gardens. Dalz. & Gibs. Suppl. p. 64; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174 & Gard. in Ind. ed. 5, p. 404.

Antirrhinum maurandioides, A. Gray, in Proc. Amer. Acad. v. 7 (1868) p. 376. A twiner, a native of Texas, with filiform stems, triangular-hastate alternate petiolate leaves, and light bluish-purple flowers on long slender pedicels. *Maurandia antirrhiniflora,* Humb. & Bonpl. ex Willd. Enum. Hort. Berol. (1809) p. 659 & in Hort. Berol. (1816) t. 83. *Maurandya antirrhiniflora,* Grah. Cat. p. 142. *Maurandya antirrhinifolia,* Dalz. & Gibs. Suppl. p. 64.

Maurandia scandens, A. Gray, in Proc. Amer. Acad. v. 7 (1868) p. 377. A handsome climber, a native of Mexico, with softly hairy somewhat hastate leaves and showy purple-violet flowers, often employed to decorate trellises around verandas. The plant climbs by a remarkable arrangement, the petiole folding itself over any available support and holding on by pressing like a letter-clip (*Woodrow*). Woodr. Gard. in Ind. ed. 5, p. 405. *Lophospermum scandens,* D. Don, in Trans. Linn. Soc. v. 15 (1827) p. 353; Dalz. & Gibs. Suppl. p. 64.

Maurandia semperflorens, Jacq. Hort. Schœnb. v. 3 (1798) p. 20. A slender climber, scandent by its petioles and pedicels, a native of Mexico. Leaves alternate, hastate or hastately 5-lobed, cordate; petioles long, twining. Flowers rosy-purple, streaked with white; pedicels long, twining. Dalz. & Gibs. Suppl. p. 64. *Maurandya semperflorens,* Bot. Mag. t. 460; Grah. Cat. p. 142.

Maurandia Barclaiana, Lindl. Bot. Reg. v. 13 (1827) t. 1108. A handsome climber, a native of Mexico, often grown to ornament veranda-trellises. It has alternate petiolate angled cordate acuminate

leaves, and solitary axillary flowers pale in the corolla-tube and with violet and purple shades in the limb. *Maurandia Barclayana*, Woodr. Gard. in Ind. ed. 5, p. 405. *Maurandya Barclayana*, Dalz. & Gibs. Suppl. p. 63.

Russelia juncea, Zucc. in Flora, v. 15, part 2 (1832) Beibl. p. 99. A handsome plant, a native of Mexico, much grown in gardens, bushy, 3–4 ft. high, with long rush-like stems and bright scarlet tubular flowers which bloom throughout the year. The plant, which was introduced into Bombay about the year 1850, is easily cultivated, every part of it that touches the ground during the rainy season taking root. Dalz. & Gibs. Suppl. p. 64; Woodr. Gard. in Ind. ed. 5, p. 404. *Russelia floribunda*, Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174 (*not* of H. B. & K.).

Russelia rotundifolia, Cav. Icon. v. 5 (1799) p. 9, t. 415. Not so showy a plant as the former, than which it is less common, a native of Mexico. It has opposite sessile suborbicular cordate reticulately veined leaves, and scarlet flowers in axillary and terminal racemes. Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 174 & Gard. in Ind. ed. 5, p. 404. *Russelia floribunda*, H. B. & K. Nov. Gen. Pl. v. 2, p. 359; Dalz. & Gibs. Suppl. p. 64.

Scoparia dulcis, Linn. Sp. Pl. (1753) p. 116. A small branched leafy annual herb, 1–3 ft. high, with opposite and 3-nately whorled leaves, 4 oblong sepals, and white flowers. This weed, a native of Tropical America, is becoming naturalized in many parts of India, notably in Bengal. Woodrow reports having found it in a salt swamp near Bombay, flowering in November. I have not seen his specimens. Fl. B. I. v. 4, p. 289; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.

EXCLUDED SPECIES.

MAZUS RUGOSUS, Lour. Fl. Cochinch. (1790) p. 385. Dalzell & Gibson (Bo. Fl. p. 176) mention this as occurring on garden walks in Tanna, but, though often searched for, neither I nor any of the Poona plant-collectors have found it. There is 1 specimen in Herb. Kew. collected by Dalzell, on which appears in his own handwriting "Found in a garden, but I do not think indigenous."

ORDER XCI. OROBANCHACEÆ.

Perennial root-parasites without leaves or chlorophyll; stem usually simple, stout or slender, scaly. Flowers hermaphrodite, irregular, solitary or in spikes or racemes; bracts large, scale-like; bracteoles 1–2, scale-like or 0. Calyx spathaceous or 2-lipped, or with 4–5 free or connate segments. Corolla hypogynous, curved, usually distinctly 2-lipped (occasionally subequally 5-lobed); upper lip often vaulted; throat usually with 2 villous folds. Stamens didynamous, inserted on the corolla-tube; anthers 1–2-celled, the cells frequently spurred at the base, opening by slits or apical pores, 1 cell often imperfect. Disk glandular or unilateral or 0. Ovary of 2 (rarely 3) connate carpels 1

(rarely 2) -celled; ovules many (rarely few), anatropous, on 2 (rarely 3) pairs of free or confluent parietal placentas which sometimes ultimately meet in the centre of the ovary. Capsule usually 1-celled, sometimes imperfectly or perfectly 2-celled; valves 2 (rarely 3). Seeds many, minute; testa usually pitted or tuberculate; albumen fleshy; embryo ovoid, often undivided.—DISTRIB. Temperate and tropical regions; genera 11; species about 150.

Corolla-lobes all broad, subequal.	
Anther-cells unequal.	
Calyx spathaceous, split in front nearly to the base...	1. ÆGINETIA.
Calyx tubular-campanulate, 5-toothed or 5-lobed.....	2. CHRISTISONIA.
Anther-cells equal	3. CISTANCHE.
Corolla 2-lipped, the upper lip 2-lobed, the lower lip 3-lobed...	4. OROBANCHE.

1. ÆGINETIA, Linn.

Leafless herbs with branched or simple naked or scaly scapes or stems. Flowers few, large, solitary or corymbose; bracteoles 0. Calyx spathaceous, split down the front nearly to the base. Corolla broad, incurved, tubular, obscurely 2-lipped; lobes 5, broad, spreading, the 2 upper connate. Stamens 4, didynamous, included; anthers meeting in pairs, with 1 perfect cell, the absent cell in the lower pair represented by an empty clavate and deflexed spur. Ovary 1-celled; placentas large, 2- or more lobed, filling the cavity, ovuliferous all over; style slender; stigma large, peltate. Capsule partially 2-valved. Seeds crowded, minute, reticulate.—DISTRIB. Tropical Asia; species 4 or 5.

1. **Æginetia indica,** *Linn. Sp. Pl.* (1753) p. 632. Whole plant purplish, drying brown; rhizome rather small, tuberous, with numerous short branched coral-like roots. Scapes 1 or several from the rhizome, 6–12 in. high, erect, slender, with or without a few scales at the base. Flowers large, solitary, like the bowl of a tobacco-pipe on the top of the naked scape, nodding. Calyx ¾–1½ in. long, completely closed in bud, pointed, glabrous, veined. Corolla purple; tube 1–1½ in. long, curved, inflated; limb ¾–1 in. across, the lobes small, equal, rounded. Lower pair of anthers with thick blunt spurs behind. Capsules ¾ in. long, ovoid, beaked, enclosed in the persistent calyx and corolla. Seeds numerous, minute, reticulate, pale-yellow. Fl. B. I. v. 4, p. 320; Grah. Cat. p. 146; Dalz. & Gibs. p. 202; Wight, Icon. t. 895; Trim. Fl. Ceyl. v. 3, p. 261; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: Oct.

KONKAN: *Dalzell & Gibson, Law*!; Salsette, *Nimmo* ex *Graham*; Sewree near Bombay, *Woodrow*; Neral, *Bhiva*! DECCAN: Khandala, below bushes, *Graham*; Koina valley below Mahableshwar, *Cooke*!—DISTRIB. Throughout India; Ceylon, China, Japan, Philippine Islands.

2. CHRISTISONIA, Gardn.

Fleshy low scaly parasitic herbs; stems simple or tufted from a short or long rootstock; scales alternate, obtuse or acute. Flowers with or without bracteoles. Calyx tubular, terete or angular, 5-toothed or -lobed. Corolla-tube long, inflated or infundibuliform, straight or curved; limb with 5 broad subequal rounded lobes, the 2 upper (inner in bud) suberect, the 3 lower spreading. Stamens 4, included or subexserted; filaments

stout; anther-cells 1 perfect and 1 imperfect, which latter is spurred or appendaged, rarely both perfect. Disk 0. Ovary 1-celled with 2 bipartite placentas, or 2-celled from the placentas meeting in the axis; ovules many; style long, incurved at the tip; stigma large, 2-lobed, the upper lobe very small, the lower very large, orbicular or clavate. Capsule ovoid or subglobose, loculicidal. Seeds very numerous, minute, many perfect with striate testa, others imperfect with lax testa; embryo half as long as the albumen.—DISTRIB. Tropical Asia; species 10.

Pedicels short, less than ½ in..... 1. *C. Lawii.*
Pedicels long, sometimes exceeding 2 in..... 2. *C. calcarata.*

1. **Christisonia Lawii,** *Wight, Icon.* (1850) t. 1427. Stems several, very stout, 1–3 in. high, thickened upwards, often slightly curved, densely clothed with closely imbricate dark-brown scales which become larger upwards. Flowers from the upper scales; pedicels less than ½ in. long; bracteoles 0. Calyx ½ in. long, tubular, divided about ⅓ the way down; teeth 5, triangular, acute. Corolla minutely pubescent on both sides, reaching 2 in. long, tubular, the tube dull white, the limb bluish-purple outside, yellow inside; limb sub-bilabiate, the 2 upper lobes erect, the 3 lower horizontal, all subequal, rounded at the apex and with slightly waved margins. Stamens didynamous, the lower pair much shorter than the upper; filaments inserted below the middle of the tube, clothed with minute short white hairs; anthers pale, 2-celled, one of the cells fertile, ovate, with a subulate apex and a pore, the other cell sterile, subulate, shaped like an inverted comma. Ovary 1-celled; style longer than the stamens, white, glabrous; stigma with 2 rounded lobes; placentas 2, quite free though closely approaching (*Ritchie*). Capsules not seen. Fl. B. I. v. 4, p. 322; Dalz. & Gibs. p. 202; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: July–Aug.

KONKAN: Salsette, *Dalzell & Gibson*; Tanna, *Law* ex *Wight*. DECCAN: Purandhar, *Woodrow*. S. M. COUNTRY: between Rámghát and Belgaum, *Dalzell & Gibson*; Belgaum, *Ritchie*, 1930!—DISTRIB. India (W. Peninsula).

2. **Christisonia calcarata,** *Wight, Icon.* (1850) t. 1426. Glabrous except the corolla; stem usually simple; scales broadly ovate, concave, obtuse, not imbricating in the upper part of the stem, crowded below. Flowers racemose; pedicels very long, sometimes exceeding 2 in.; bracteoles 0. Calyx ½–¾ in. long, tubular; teeth ⅛–⅙ in. long, broadly triangular, acute. Corolla 1½–2½ in. long, tubular, pubescent, the tube white, the lobes of the limb pale-blue; tube cylindric, slightly dilated upwards; limb obliquely 2-lipped, the upper lip with 2, the lower with 3 rounded lobes. Filaments pubescent; anthers 2-celled, the lower cell sterile, produced into a conical acute spur. Stigma 2-lobed. Capsules ¼–⅜ in. in diam., globose, crowned by the persistent calyx-teeth. Seeds about ⅒ in. in diam., subglobose or ovoid, reticulate. Fl. B. I. v. 4, p. 322. *Christisonia Stocksii*, Hook. Icon. Pl. v. 9, t. 836; Dalz. & Gibs. p. 202.—Flowers: July–Aug.

Sir Joseph Hooker suggests (Fl. B. I. l. c.) that this plant may be a more developed state of *C. Lawii*.

KONKAN: *Law*!, *Dalzell*!; Tanna, *Law* ex *Wight*; Salsette, on roots of a *Strobilanthes, Dalzell*! SIND: on roots of a *Strobilanthes, Stocks* ex *Hooker*.—DISTRIB. India (W. Peninsula).

3. **CISTANCHE,** Hoffmgg. & Link.

Scapigerous herbs; scape or stem simple, scaly. Flowers in dense spikes, yellow, violet, or purple; bracteoles 2. Calyx broadly tubular-campanulate; lobes 5, subequal, obtuse. Corolla-tube long, curved, dilated above; limb spreading, oblique, with 5 broad subequal lobes. Stamens 4, subexserted; anthers subtransverse, often villous, the cells equal, parallel, bases obtuse. Ovary 1-celled; placentas 4, equidistant or in pairs; stigma broad. Capsule ovoid, laterally compressed, 4-valved to the base. Seeds numerous, subglobose, reticulately punctate. —Distrib. Mediterranean region, N. Africa; Tropical, Western, and Central Asia; species 12.

1. **Cistanche tubulosa,** *Wight, Icon.* t. 1420 *bis* (1850). General color of plant yellow with an occasional tinge of purple (*Stocks*); stem ½–5 ft. high, sometimes reaching 2 in. in diam., unbranched, furrowed, fleshy, glabrous or more or less pubescent, densely covered with triangular acute scales. Flowers numerous, in dense spikes 6–10 in. long, sometimes 3 in. in diam.; bracts lanceolate, with membranous margins, acuminate, longer than the calyx; bracteoles with membranous margins, shorter than the calyx, linear-lanceolate. Calyx tubular-campanulate, ½–¾ in. long; lobes about ⅓ as long as the tube, rounded, subequal, with membranous margins, veined. Corolla yellow, hairy at the base inside, 1–2 in. long, the lower half tubular, erect, the upper half campanulate, bent outwards from the middle; limb shortly 5-lobed, the lobes rounded, reflexed. Filaments woolly at the base; anthers subexserted, woolly, not or scarcely apiculate. Placentas 4, subequidistant. Style exserted, curved below the stigma. Capsules 1 in. long, ovoid-oblong, laterally compressed, beaked. Seeds numerous, subglobose, $\frac{1}{20}$ in. in diam., deeply pitted. Fl. B. I. v. 4, p. 324; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. *Cistanche lutea*, Wight, Ill. v. 2, p. 180, t. 158 *b*, fig. 4 (*not* of Hoffmgg. & Link).—Flowers: Dec.

Scarcely differs from *C. lutea*, Hoffmgg. & Link, the apiculation of the anthers being the distinctive character. This, however, in Tropical African specimens, does not seem to be always a constant one.

Sind: common, *Stocks*!, *Dalzell*!; Karachi, *Oman*!, *Cooke*!; *Constable*!, *Woodrow*. —Distrib. India (Panjáb); Central Asia and westwards to Arabia.

4. **OROBANCHE,** Linn.

Scapigerous scaly herbs; scapes or stems simple or branched, stout or slender; scales acute. Flowers in dense or lax or interrupted spikes or racemes; bracts scale-like; bracteoles 2 or 0. Calyx unequally 4-fid or 2-partite from back to front, the segments entire or 2-fid with rarely a 5th tooth or segment. Corolla 2-lipped; tube curved, dilated above, circumscissile below; upper lip erect, crenulate, notched or 2-fid; lower somewhat spreading, 3-lobed. Stamens 4, didynamous, included; anther-cells equal, parallel, the bases usually mucronate. Disk 0 or glandular. Ovary 1-celled; placentas 4, equidistant or paired; ovules very many; style simple; stigma funnel-shaped or peltate, or more or less laterally 2-lobed. Capsule 2-valved, the valves often cohering with the style. Seeds very many, small, subglobose or ovoid.—Distrib. Chiefly in the northern and subtropical regions of the Old World; species about 100.

Bracteoles 0; stamens inserted at about the middle of the corolla-tube; anthers glabrous	1. *O. cernua* var.
Bracteoles 2; stamens inserted near the base of the corolla-tube; anthers woolly	2. *O. ægyptiaca*.

1. **Orobanche cernua,** *Lœfl. It. Hisp.* (1758) p. 152, VAR. **desertorum,** *Ritter Beck, Monogr. Orob. in Biblioth. Bot.* Heft 19 (1890) p. 142, fig. 33 (1). Stems 1 or more, stout or slender, pale-brown, puberulous; scales ovate or ovate-lanceolate, acuminate, $\frac{1}{5}$–$\frac{1}{3}$ in. long. Spikes very dense, cylindric, obtuse; bracts ovate-lanceolate, longer than the calyx, thick and with numerous strong parallel nerves. Calyx $\frac{3}{8}$ in. long, membranous; sepals lanceolate, cuspidate, with a strong midrib and conspicuous parallel nerves. Corolla curved outwards, $\frac{3}{4}$ in. long, glabrous, with a violet limb and white tube; upper lip 2-lobed, the lobes small, erecto-patent with irregularly crenate margins; lobes of the lower lip subequal, small, suborbicular; tube constricted in the middle. Stamens inserted about or a little below the middle of the tube; filaments dilated at the base, glabrous or sometimes pubescent at the very base; anthers obovate, the cells mucronate at the base, glabrous. Capsules ellipsoid, scarcely exceeding the calyx. Seeds scarcely $\frac{1}{50}$ in. long, ovoid, reticulate. *Orobanche nicotianæ*, Wight, Ill. v. 2 (1850) p. 179, t. 158; Hook. f. Fl. B. I. v. 4, p. 326.

I have seen no specimens of this plant from the Deccan, where it is said to occur on tobacco, nor is it included in Woodrow's list. Dalzell's specimen in Herb. Kew. is from Coimbatore.—DISTRIB. India (W. Peninsula).

2. **Orobanche ægyptiaca,** *Pers. Syn.* v. 2 (1807) p. 181. Stem 4–20 in. high, more or less branched from the base; scales few, lanceolate, sparingly pubescent or glabrescent, $\frac{1}{5}$–$\frac{5}{8}$ in. long. Flowers sessile, or the lower shortly pedicellate, numerous, in cylindric spikes which are at first condensed, afterwards usually lax, the lower flowers often remote; bracts lanceolate, pubescent; bracteoles narrowly linear, shorter than the calyx. Calyx pubescent, $\frac{3}{8}$ in. long, campanulate. 4-toothed, submembranous; teeth lanceolate-subulate from a broad base, about equalling the tube and with a strong mid-nerve. Corolla $\frac{3}{4}$–$1\frac{1}{4}$ in. long, pubescent outside, the upper part blue or lilac, the lower part nearly white; upper lip 2-lobed, the lobes obtuse or subacute; lower lip equally 3-lobed, the lobes usually rounded; tube slightly curved near the top, constricted above the insertion of the stamens about $\frac{1}{4}$ in. above the base. Filaments inserted low down in the tube, pubescent at the base; anthers obovate, woolly, the cells usually separating from a mucronate base. Stigma large, with 2 nearly semicircular lobes. Capsules nearly $\frac{1}{2}$ in. long, oblong, acuminate, glabrous, 2-valved. Ripe seeds about $\frac{1}{40}$ in. in diam., subglobose or ovoid, reticulate. Ritter Beck, Monogr. Orob. in Biblioth. Bot. Heft 19 (1890) p. 100, fig. 14 (1). *Orobanche indica*, Buch.-Ham. in Roxb. Fl. Ind. v. 3 (1832) p. 27; Hook. f. Fl. B. I. v. 4, p. 326; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175; Watt, Dict. Econ. Prod. v. 5, p. 495. *Phelipæa indica*, G. Don, Gen. Syst. v. 4 (1837) p. 632; Grah. Cat. p. 146; Dalz. & Gibs. p. 202.—Flowers: Oct.

I cannot find that the calyx is divided to the base on the upper side as stated under Sec. II. (*Trionychon*) in Fl. B. I. (*l. c.*).

DECCAN and GUJARAT, parasitic on tobacco plants, also on *Papaver*, *Cannabis*, and some species of *Brassica* (Prain).—DISTRIB. More or less throughout the plains of India; Central and Western Asia.

Order XCII. LENTIBULARIACEÆ.

Herbs, aquatic or in wet places, often furnished with bladder-like appendages for the capture and digestion of small organisms. Leaves rosulate, or when submerged capillaceo-multifid, sometimes obsolete. Flowers yellow, purple, blue or white, irregular, hermaphrodite, on 1-many-flowered simple or sparingly branched scapes or peduncles; bracts small or 0; bracteoles 2 or 0. Calyx inferior, 2–5-lobed or -partite, regular or more or less 2-lipped. Corolla gamopetalous, 2-lipped, spurred; upper lip usually the smaller, entire or emarginate, innermost in bud; lower lip 2–6-lobed; tube very short. Stamens 2, inserted on the base of the corolla, alternate with the lobes of the lower lip; filaments usually curved; anthers 2-celled, the cells ovate, diverging, usually transversely confluent, dehiscing longitudinally. Ovary superior, 1-celled, globose; ovules numerous (rarely few), on a free basal placenta, anatropous; style short; stigma unequally 2-lobed. Capsule 1-celled, few- or many-seeded, globose, dehiscing by 2–4 valves, or circumscissile, or irregularly rupturing. Seeds minute, variously shaped; albumen 0. — Distrib. Cosmopolitan; genera 5; species about 200.

1. UTRICULARIA, Linn.

Annual or perennial herbs floating, or terrestrial in wet places or on wet rocks, usually provided with bladder-like organs. Leaves in floating species multifid with capillary segments, in erect or twining species entire, frequently with minute bladders. Flowers in simple or branched, few- or many-flowered racemes; pedicels bracteate and often 2-bracteolate. Calyx 2-partite; lobes entire or subentire, often enlarged in fruit, subequal. Corolla 2-lipped; upper lip entire, emarginate or 2-fid; lower lip usually much larger than the upper, 3–6-lobed; tube with a straight or curved spur. Stamens 2; filaments broad; anthers dorsifixed, cells subdistinct or quite confluent. Ovary subglobose, 1-celled; ovules many, sessile on a central fleshy placenta, anatropous; style short; stigma unequally 2-lobed. Capsule globose, 2–4-valved or dehiscing irregularly. Seeds many, variously shaped, small; albumen 0.— Distrib. Mainly in the tropics of both hemispheres; species 100 or more.

Aquatic; stolons submerged; leaves whorled, with capillary persistent segments.
  Flowers on short pedicels; peduncles with a whorl of spongy floats below the inflorescence ..... 1. *U. stellaris.*
  Flowers on long pedicels; peduncles without floats.
    Large; leaves 1½–3 in. long; seeds not or scarcely winged..... 2. *U. flexuosa.*
    Small; leaves rarely exceeding ¼ in. long; seeds with a broad corky wing ..... 3. *U. exoleta.*
Terrestrial; leaves usually evanescent except in *U. striatula* (no. 10).
  Leaves more or less linear; sepals nearly equal; seeds reticulate.
    Scales and bracts of the scape attached by their bases.
      Scapes erect.
        Pedicels recurved in fruit.

Spur much shorter than the lower lip, nearly straight, conical	4. *U. alho-cærulea.*
Spur about equalling the lower lip, falcately curved, linear-subulate	5. *U. arcuata.*
Pedicels not recurved in fruit.	
Spur straight; lower sepal entire at the apex	6. *U. affinis.*
Spur curved; lower sepal usually 2-toothed	7. *U. cærulea.*
Scapes twining	8. *U. reticulata.*
Scales and bracts of the scape attached by the middle.	9. *U. nivea.*
Leaves orbicular or reniform, persistent; sepals very unequal; seeds glochidiate	10. *U. striatula.*

1. **Utricularia stellaris,** *Linn. f. Suppl.* (1781) p. 86. An aquatic herb, the peduncles suspended in water by means of a whorl of oblong vesicles about their middle; stolons submerged, often very slender, sometimes filiform, not much branched. Leaves all submerged, ½–1½ in. long, often in whorls of 4, pinnately cut into numerous capillary slender pectinate segments, each pinna usually provided near the base with a small globular-ovoid bladder $\frac{1}{16}$–$\frac{1}{12}$ in. in diam., with a truncate mouth. Flowers in slender erect few–12-flowered racemes; peduncles 1–8 in. long; floats in whorls of 4–8 attached about ½ in. below the lowest flower, broadly ellipsoid or ovoid, reticulately veined, ¼–⅓ in. long, with a tuft of reduced filiform pinnæ at the apex; bracts $\frac{1}{16}$–$\frac{1}{12}$ in. long, broadly ovate, obtuse; bracteoles 0; pedicels $\frac{1}{10}$–⅛ in. long, thickened, usually deflexed in fruit. Calyx 2-partite, $\frac{1}{10}$–⅛ in. long; sepals subequal, suborbicular, veined, enlarged in fruit. Corolla yellow, ¼ in. across; upper lip rotund-ovate, $\frac{1}{10}$–⅛ in. long; lower lip subquadrate, ⅙ in. long; spur subcylindric, stout, blunt, appressed to the lower lip, than which it is rather shorter. Capsules globose, ⅙ in. in diam. Seeds scarcely $\frac{1}{30}$ in. in diam., discoid, prismatic in cross section, 4–6-angled, concavo-convex by the inflexion of the entire thin slightly-winged margin. Fl. B. I. v. 4, p. 328; Grah. Cat. p. 165; Dalz. & Gibs. p. 135; Wight, Icon. t. 1567; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 174; Kamienski, in Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 112, fig. 47, E; Trim. Fl. Ceyl. v. 3, p. 267; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175.—Flowers: Nov.

Konkan: *Stocks!, Dalzell & Gibson*; Malwán, *Woodrow!* S. M. Country: Belgaum, Kákti tank, *Ritchie*, 1965!—Distrib. Throughout India in rice-swamps and tanks; Ceylon, Malaya, S.E. Asia, Australia, Tropical and S. Africa.

2. **Utricularia flexuosa,** *Vahl, Enum.* v. 1 (1805) p. 198. Stolons floating in large masses a little below the surface, often very long, rather stout, much-branched. Leaves 1½–3 in. long, usually in whorls of 4, pinnately divided into numerous filiform pectinate segments, each pinna usually with a nearly globose bladder near its base. Flowers few, in erect racemes; peduncles long, sometimes reaching 9 in., naked or with a few small scales, without a whorl of floats below the flowers, but the whorl of leaves at the base of the peduncles often with the rhachis much inflated (acting as a float) and the segments very short; bracts ovate, small; pedicels ¼–¾ in. long, at first erect, afterwards deflexed. Calyx ⅛–⅙ in. long; sepals ovate-oblong, obtuse, veined, somewhat enlarged in fruit. Corolla yellow, ⅛–¼ in. across; spur rather shorter than the lower lip, conical, acute. Capsules ⅙ in. in diam., globose, beaked with the thick persistent style. Seeds $\frac{1}{30}$–$\frac{1}{20}$ in. in diam.,

discoid, prismatic in cross section, irregularly 4–6-angled, concavo-convex by the inflexion of the thin scarcely winged margin. Fl. B. I. v. 4, p. 329; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 175; Trim. Fl. Ceyl. v. 3, p. 267; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. *Utricularia fasciculata*, Roxb. Fl. Ind. v. 1, p. 143; Wight, Icon. t. 1568.—Flowers: Nov.

The absence of floats on the peduncle distinguishes this species from *U. stellaris*, than which it is also larger in all its parts.

Deccan: Poona, *Woodrow*.—Distrib. Throughout India in rice-swamps and tanks; Ceylon, S.E. Asia, Malaya, N. Australia.

3. **Utricularia exoleta,** *R. Br. Prodr.* (1810) p. 430. A small aquatic herb floating in water or growing on liquid mud; stolons varying in length, branched, the branches often fascicled, very slender, flattened. Leaves variable, rarely more than $\frac{1}{4}$ in. long, very sparingly dissected, the segments normally capillary, but sometimes 1 or several of them represented by bladders, or sometimes the whole leaf represented by a bladder; bladders $\frac{1}{20}$ in. long or less, obliquely ovoid, the mouth nearly apical, truncate and with slender branched rather long cilia. Flowers in 2–3-flowered (often reduced to a single flower) racemes; peduncles $1\frac{1}{2}$–3 in. long, with a minute bract or scale usually below the middle; bracts below the pedicels membranous, $\frac{1}{25}$ in. long, broadly ovate, truncate or rounded; pedicels $\frac{1}{6}$–$\frac{1}{3}$ in. long, slender, permanently obliquely erect. Calyx $\frac{1}{10}$ in. long; sepals subequal, broadly elliptic, obtuse, membranous, not conspicuously veined, scarcely enlarged in fruit. Corolla yellow with orange streaks, $\frac{1}{5}$–$\frac{1}{4}$ in. long; upper lip ovate or suborbicular, entire or nearly so, $\frac{1}{12}$–$\frac{1}{8}$ in. long; lower lip $\frac{1}{8}$ in. long, subquadrate, more or less 2-lobed; spur conical, obtuse, as long as or slightly longer than the lower lip. Capsules globose, $\frac{1}{8}$–$\frac{1}{6}$ in. in diam. Seeds about $\frac{1}{20}$ in. in diam., orbicular, flat, surrounded by a more or less crenulate corky wing which is about as broad as the nucleus. Fl. B. I. v. 4, p. 329; Trim. Fl. Ceyl. v. 3, p. 268; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 175. *Utricularia diantha*, Rœm. & Schult. Syst. Mant. 1 (1822) p. 169; Wight, Icon. t. 1569; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 176.—Flowers: Feb.

Rare. Konkan: Dapoli, *Nairne*. Kanara: Samasgi (N. Kanara), *Woodrow*.—Distrib. Throughout India, but not very common; Ceylon, Malaya, China, Australia, Africa, Portugal.

4. **Utricularia albo-cœrulea,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 279. A small plant 4–8 in. high, growing on wet rocks; roots sparingly branched, their fibres slender and with a few minute bladders. Leaves radical, small, scarcely $\frac{1}{4}$ in. long, spathulate-oblong, very deciduous. Scapes terete, erect, usually 1–2 (less commonly 4–5) -flowered, sometimes with a few small ovate-oblong acute scales attached by their bases; bracts beneath the pedicels broadly ovate-oblong, membranous, $\frac{1}{20}$ in. long, attached by their bases; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, recurved in fruit. Calyx $\frac{1}{10}$ in. long; sepals ovate, acute, enlarged in fruit. Corolla large, fragrant, having an odor of heliotrope; upper lip $\frac{1}{6}$–$\frac{1}{5}$ in. long, suborbicular, rounded and usually notched at the apex, white, ribbed with purple veins; lower lip large, $\frac{3}{8}$–$\frac{1}{2}$ in. long and broad, quadrate-orbicular, slightly 4-lobed, very convex, bluish-purple, the

centre white with a yellow spot at the base; spur pendent, slightly curved, conical, acute, much shorter than the lower lip. Stigma sessile or nearly so. Capsules globose, $\frac{1}{10}$–$\frac{1}{8}$ in. in diam., covered by the enlarged sepals which are at length slightly decurrent on the pedicel. Seeds $\frac{1}{60}$ in. long, oblong, rounded at both ends, scrobiculate. Fl. B. I. v. 4, p. 330; Dalz. & Gibs. p. 135; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 177; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 176.—Flowers: Sept.–Nov. VERN. *Kajat cha ghás*; *Sita chi ásre* (Sita's tears).

Rare. KONKAN: *Stocks*!; Vingorla on wet rocks, *Dalzell*!; Ratnagiri, *Nairne*. DECCAN: Mahableshwar, *Cooke*!, *Woodrow*!—DISTRIB. Apparently endemic.

5. **Utricularia arcuata,** *Wight, Icon.* v. 4 (1850) t. 1571, fig. 1. Roots branched, furnished with small bladders. Leaves $\frac{1}{4}$–$\frac{3}{8}$ in. long, radical, deciduous, linear-oblong or linear-spathulate, obtuse, furnished with small globose bladders about $\frac{1}{25}$ in. in diam. Scapes 3–8 in. high, 3–8-flowered, erect, sometimes bifid, often with 2–3 minute ovate scales; bracts $\frac{1}{12}$ in. long, ovate, acute, attached by their bases; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long, slender, recurved in fruit. Calyx $\frac{1}{8}$ in. long; sepals ovate, acute, subequal or the upper a little larger, enlarged in fruit. Corolla bluish-purple; upper lip $\frac{1}{6}$ in. long, orbicular-obovate, usually entire; lower lip $\frac{1}{2}$ in. in diam., orbicular, entire (rarely emarginate); spur $\frac{1}{3}$–$\frac{1}{2}$ in. long, slender, linear-subulate, falcately curved. Stigma subsessile. Capsules subglobose, $\frac{1}{8}$ in. in diam., enclosed in the enlarged sepals. Seeds $\frac{1}{60}$ in. long, oblong-ellipsoid, rounded at both ends, scrobiculate, the outer cells of the testa elongate. Fl. B. I. v. 4, p. 330; Dalz. & Gibs. p. 136.—Flowers: Sept.

KONKAN: *Dalzell*! S. M. COUNTRY: Belgaum, *Ritchie*, 1967! KANARA: *Law*!—DISTRIB. India (W. Peninsula), apparently endemic.

6. **Utricularia affinis,** *Wight, Icon.* v. 4 (1850) t. 1580, fig. 1. A small glabrous herb. Scapes slender, 2–8 in. high. Leaves $\frac{1}{6}$–$\frac{1}{3}$ in. long, linear-oblong, obtuse, bearing bladders, very evanescent. Flowers distant, in erect racemes; bracts $\frac{1}{16}$ in. long, ovate, acute, attached by their bases; pedicels $\frac{1}{16}$–$\frac{1}{8}$ in. long, not deflexed nor recurved in fruit. Calyx $\frac{1}{8}$ in. long; upper sepal slightly larger than the lower, broadly ovate or suborbicular, sometimes apiculate; lower sepal ovate, subacute. Corolla bluish-purple; upper lip $\frac{1}{8}$ in. long, oblong or obovate-oblong, cuneate, notched; lower lip $\frac{1}{5}$–$\frac{1}{4}$ in. in diam., suborbicular or somewhat subovate, usually entire, delicately veined; spur $\frac{1}{5}$ in. long, nearly at right angles to the axis of the flower, narrowly conic, straight or nearly so. Style very short but distinct. Capsules $\frac{1}{10}$ in. long, ovoid, enclosed in the enlarged sepals. Seeds about $\frac{1}{60}$ in. in diam., subglobose, scrobiculate, the cells of the testa subhexagonal not elongate, Fl. B. I. v. 4, p. 330; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 178; Trim. Fl. Ceyl. v. 3, p. 269. *Utricularia decipiens*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 279.—Flowers: Sept.–Nov.

KONKAN: *Law*!, *Stocks*!, *Dalzell*!; Vingorla, *Dalzell & Gibson*. S. M. COUNTRY: Belgaum, *Ritchie*, 1972!—DISTRIB. India (W. Peninsula); Ceylon.

7. **Utricularia cœrulea,** *Linn. Sp. Pl.* (1753) p. 18. Scapes erect. Roots when growing in swampy places matted, with stout fibres bearing globose bladders $\frac{1}{30}$–$\frac{1}{16}$ in. in diam. Leaves $\frac{1}{2}$–2 in. long, linear-

oblong, subobtuse, entire, green, with conspicuous subparallel nerves, more or less attenuated towards the base. Scapes 2–8 in. high, simple. Flowers in the racemes 2–10, distant; bracts $\frac{1}{12}$ in. long, ovate, acuminate; pedicels $\frac{1}{6}$–$\frac{1}{3}$ in. long, slender, suberect in fruit. Calyx $\frac{1}{6}$ in. long; upper sepal broadly ovate, acuminate; lower sepal slightly narrower than the upper, usually with 2 small acute triangular teeth at the apex. Corolla bluish-purple; upper lip $\frac{1}{6}$–$\frac{1}{4}$ in. long, obovate-oblong, veined; lower lip $\frac{1}{3}$ in. long, broadly ovate, subacute, reticulately veined; spur violet (*Trimen*), $\frac{1}{4}$ in. long, narrowly conic, curved, subacute. Style short but distinct. Capsules ovoid, $\frac{1}{10}$–$\frac{1}{6}$ in. long, enclosed in the enlarged sepals. Seeds about $\frac{1}{50}$ in. long, ellipsoid or subglobose, reticulate, the outer cells of the testa oblong. Fl. B. I. v. 4, p. 331; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 179 (*not* of A. DC.); Trim. Fl. Ceyl. v. 3, p. 268; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 176. *Utricularia uliginoides*, Wight, Icon. t. 1573. *U. purpurascens*, Grah. Cat. p. 165.—Flowers: Oct.–Dec.

KONKAN: *Law*!, *Stocks*! DECCAN: Mahableshwar, *Cooke*!, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 1970! KANARA: Supa on the Kâla naddi, *Ritchie*!—DISTRIB. India (W. Peninsula); Ceylon.

8. **Utricularia reticulata,** *Smith, Exot. Bot.* v. 2 (1805) t. 119 Glabrous. Leaves numerous, $\frac{1}{2}$–$\frac{3}{4}$ in. long, narrowly linear-oblong, obtuse, usually deciduous before flowering, furnished with numerous small bladders. Scapes flower-bearing for half their length, slender, weak, flexuose, twining, 6–24 in. long, with 2 or 3 distant bracts. Flowers the largest of the Bombay species, distant, few in each raceme; bracts $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovate, very acute, attached by their bases; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long, suberect. Calyx rather more than $\frac{1}{4}$ in. long in flower; sepals ovate, acute or acuminate, much enlarged and decurrent on the pedicel in fruit. Corolla large, measuring sometimes $\frac{3}{4}$ in. and more across, bluish-purple, veined with darker veins; upper lip $\frac{1}{3}$ in. long, broadly obovate, entire; lower lip $\frac{1}{2}$–$\frac{5}{8}$ in. in diam., suborbicular, entire, bullate in the centre, with a white spot near the base; spur $\frac{1}{4}$ in. long, conic, nearly straight. Capsules $\frac{1}{4}$ in. long, ellipsoid, enclosed by the greatly enlarged sepals. Seeds about $\frac{1}{50}$ in. long, ovoid or subrhomboid, reticulate. Fl. B. I. v. 4, p. 331; Dalz. & Gibs. p. 135; Wight, Ill. v. 2, t. 143; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 180; Trim. Fl. Ceyl. v. 3, p. 269; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 176. *Utricularia graminifolia*, Grah. Cat. p. 165 (*not* of Spreng.).—Flowers: Oct.

KONKAN: *Law*!, *Stocks*!, *Dalzell*!; Mâhad in rice-fields, *Kanitkar*! DECCAN: in rice-fields tolerably common; Jambgaon, *Gangaram*! S. M. COUNTRY: Belgaum, *Ritchie*, 1966!—DISTRIB. India (W. Peninsula); Ceylon.

9. **Utricularia nivea,** *Vahl, Enum.* v. 1 (1805) p. 203. Scapes 4–12 in. high, sometimes branched, often with 2 or 3 distant scales attached by their middle and acute at both ends. Leaves $\frac{1}{2}$–$\frac{3}{4}$ in. long, linear, obtuse, very evanescent. Flowers in close racemes or spikes crowded towards the top of the scape; bracts $\frac{1}{10}$ in. long, attached at or near the middle, acute at both ends; pedicels very short, recurved, sometimes 0. Calyx puberulous, $\frac{1}{10}$ in. long; sepals equal, broadly ovate or suborbicular, very obtuse. Corolla white, or very pale-blue or reddish-purple; upper lip $\frac{1}{10}$ in. long, oblong-obovate, obtuse, entire or notched;

lower lip $\frac{1}{5}$ in. long, broadly ovate or suborbicular, with somewhat crenulate margins; spur stout, conic, subacute, exceeding the lower lip. Capsules globose, $\frac{1}{10}$ in. in diam. Seeds minute, scrobiculate. Wight, Icon. t. 1582; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 186; Dalz. & Gibs. p. 135; Trim. Fl. Ceyl. v. 3, p. 270. *Utricularia racemosa*, Wall. Cat. (1828) 1496; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 186; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 333. *U. filicaulis*, Wall. Cat. (1828) 1501; Oliv. in Journ. Linn. Soc. l. c.

KONKAN: *Stocks*!; Vingorla, *Dalzell & Gibson*. S. M. COUNTRY: Belgaum, *Ritchie*, 1968!—DISTRIB. India (Nipal, Khasia mountains, Chota Nagpur, W. Peninsula) Ceylon, Malaya, China, Borneo.

10. **Utricularia striatula,** *Sm. in Rees, Cyclop.* v. 37 (1819) n. 17. A small slender herb often growing on wet rocks; stolons filiform, creeping, bearing leaves and bladders. Leaves scattered along the stolons, usually in small rosettes at the base of the scapes, rarely more than $\frac{1}{8}$ in. in diam., orbicular or reniform, petiolate; petioles $\frac{1}{8}$–$\frac{1}{6}$ in. long. Bladders only from the stolons, obliquely ovoid, $\frac{1}{25}$ in. long, the mouth with 2 fimbriate oblong antennæ. Scapes filiform, 1–6 in. long, with or without scales, few- to 10-flowered; bracts about $\frac{1}{16}$ in. long and like the scales attached much below the middle; bracteoles 2, oblong-lanceolate, shorter than the bracts; pedicels capillary, $\frac{1}{20}$–$\frac{1}{5}$ in. long, distant, spreading. Sepals very unequal, more or less orbicular; the upper at length up to $\frac{1}{8}$ in. long and adnate to the capsule; the lower $\frac{1}{25}$ in. long, reflexed. Corolla large for the size of the plant, violet, with a yellow spot at the base of the lower lip; upper lip $\frac{1}{12}$ in. long, suborbicular, emarginate, rather broader than long; lower lip $\frac{1}{4}$ in. long, rather broader than long, 5-toothed or -lobed; spur $\frac{1}{5}$ in. long, subulate, deflexed. Stigma subsessile. Capsules subglobose. Seeds oblong-ellipsoid, minute, elegantly glochidiate. *Utricularia orbiculata*, Wall. Cat. (1828) 1500; Oliv. in Journ. Linn. Soc. v. 3 (1859) p. 187; Dalz. & Gibs. p. 136; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 334; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 176. *U. glochidiata*, Wight, Icon. t. 1581.—Flowers: Sept.

KONKAN: *Law*!, *Stocks*!; abundant on the wet rocks in the Railway-cuttings on the Bhor Ghát (G. I. P. R.) in September, *Cooke*! DECCAN: Panchgani Ghát on wet rocks, *Cooke*!, *Woodrow*!; Lanoli, *Woodrow*; Khandala, *Woodrow*.—DISTRIB. More or less throughout India in the hills; Ceylon; Malaya, S. China, Tropical Africa.

ORDER XCIII. GESNERIACEÆ.

Herbs or undershrubs. Leaves opposite, alternate, or solitary, entire or toothed; stipules 0. Flowers hermaphrodite, usually irregular, on axillary or terminal peduncles, cymose, rarely 1-flowered; bracts small or large; bracteoles usually small. Calyx-segments 5, valvate or open (very rarely imbricate). Corolla gamopetalous, tubular; lobes usually 5, imbricate in bud. Stamens inserted on the corolla-tube, usually didynamous, sometimes 5 fertile, often only 2 fertile; anthers 2- or often by early confluence 1-celled, usually conniving or connate in pairs, dehiscing longitudinally. Disk annular or shortly cylindric (sometimes

unilateral), or 0. Ovary 1- or imperfectly 2-celled; ovules numerous, anatropous, on 2-fid parietal sometimes subconfluent placentas; style linear; stigma capitate or 2-lobed. Fruit capsular or baccate, dehiscent or indehiscent. Seeds small, numerous, fusiform or ovoid, smooth, sometimes tipped with a long hair; albumen scanty or 0; embryo straight.—DISTRIB. Mostly in S.E. Asia, Polynesia, and Tropical America; genera about 85; species about 900.

Seeds tipped with a long hair; perfect stamens 4, didynamous. Epiphytic undershrub with fleshy leaves	1. ÆSCHYNANTHUS.
Seeds not tipped with hairs; stamens not didynamous.	
Capsule loculicidally dehiscent.	
Capsule linear or long-lanceolate, much exceeding the calyx; placentas not bearing seeds on their inner faces; perfect stamens 2	2. CHIRITA.
Capsule ellipsoid or oblong, scarcely exceeding the calyx; placentas bearing seeds on all sides.	
Perfect stamens 4	3. KLUGIA.
Perfect stamens 2	4. RHYNCHOGLOSSUM.
Capsule circumscissilely dehiscent. Flowers subcapitate; perfect stamens 2; capsule globose	5. EPITHEMA.

1. ÆSCHYNANTHUS, Jack.

Epiphytic undershrubs. Leaves opposite, fleshy or thickly coriaceous, usually entire. Flowers often showy, fascicled in the axils or at the tops of the branches (rarely solitary); bracts ovate, usually small. Calyx truncate, 5-fid or 5-partite. Corolla tubular, ventricose or enlarged above, usually incurved; lobes 5. Stamens 4, perfect, didynamous, attached at or below the middle of the tube, usually exserted; anthers cohering in pairs, their tips often free during flowering. Disk annular. Ovary superior, oblong or linear, stipitate; style short or long; stigma dilated, truncate, peltate or concave; placentas naked on the inner face, bearing ovules on the involute margins. Capsule long, linear, loculicidally 2-valved; valves placentiferous. Seeds very many, oblong or linear, with 1 or more hairs at the end near the hilum and 1 at the apex.—DISTRIB. India, Malaya; species more than 60.

1. **Æschynanthus Perottetii,** *A. DC. Prodr.* v. 9 (1845) p. 261. An epiphytic shrub; branches long, smooth, more or less compressed, swollen at the nodes. Leaves subfleshy, 2–4½ by ¾–1 in., lanceolate, obtusely acuminate, reticulately veined, glabrous, base acute or rounded; petioles ¼–⅜ in. long, stout. Pedicels ⅜–½ in. long, near the apices of the branches, subumbellately 2–6-flowered or often solitary in the axils of the terminal pair of leaves. Calyx ¼–⅜ in. long, 5-partite nearly to the base; tube about $\frac{1}{16}$ in. long; segments narrowly linear, obtuse. Corolla 1¼–1½ in. long, scarlet, glabrous or slightly pubescent outside, deciduous, being soon pushed off by the expanding capsule; tube curved, enlarged at the mouth; mouth oblique; lobes reflexed, rounded, ciliate, marked with dark purple lines, the 2 lateral lobes longer than the other 3. Stamens much exserted; filaments minutely glandular-pubescent. Capsules reaching 8 in. long, linear, acute, glabrous. Seeds about $\frac{1}{20}$ in. long, narrowly oblong-ellipsoid, acute and with a long hair at each end. Fl. B. I. v. 4, p. 339; Dalz. & Gibs. p. 135; C. B. Clarke, in DC. Monogr. v. 5, part 1 (1883) p. 25; Talb. Trees, Bomb. ed. 2, p. 254;

Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 176. *Æschynanthus ceylanica*, Wight, Icon. t. 1347. *Æ. grandiflorus*, Grah. Cat. p. 146 (*not* of Spreng.).—Flowers: Oct.–Jan.

Konkan: Ghâts, *Talbot*. Deccan: Koina valley, below Mahableshwar, *Cooke*!, *Woodrow*! S. M. Country: Párva Ghât, *Stocks*!, *Dalzell*!; Rámghât, *Ritchie*, 1861! Kanara: on trees in evergreen forests of N. Kanara Ghâts, common on the Nilkund Ghât, *Talbot*.—Distrib. India (W. Peninsula).

I have included in the above the vars. *malabarica* and *planiculmis* (C. B. Clarke, in DC. Prodr. l. c.). The former is said to differ in the leaves which are acute at the base (the bases of the type being rounded) and in a shorter calyx. But I have found *on the same plant* leaves with acute and rounded bases, while the length of the calyx in plants whose leaves are acute at the base has often reached $\frac{3}{8}$ in. Dalzell & Gibson (Bo. Fl. p. 135) describe the leaves of the *Æschynanthus* of Parwar (now Párva) Ghât (not Panoar as entered by error in DC. Monogr. l. c. p. 26 and in Fl. B. I. l. c. p. 340) as *rather obtuse* at the base.

The var. *planiculmis* (DC. Monogr. l. c. p. 26) (*platyculmis* in Hook. f. Fl. B. I. v. 4, p. 340) is distinguished by its flattened branches, a condition not uncommon in epiphytic plants and depending on the force with which the young stems have been pressed against the supporting tree, as well perhaps as on the time of year in which the specimens were collected. The succulent branches of epiphytes are often swollen in the rainy season and dry up much in the hot weather.

It seems probable that the species *Æ. ceylanica* (Gard. in Calc. Journ. Nat. Hist. v. 6 (1846) p. 474), which differs from *Æ. Perottetii* by a slightly shorter corolla, should be included in that species. The chief distinctive character on which Gardner (*l. c.*) relies, viz. the difference in the length of the capsule, does not exist.

2. **CHIRITA,** Buch.-Ham.

Herbs or low undershrubs. Leaves opposite, often unequal (sometimes whorled or alternate), elliptic or ovate (rarely lanceolate). Flowers in many- or few-flowered axillary cymes, sometimes reduced to a single flower; bracts free or connate, deciduous. Calyx 5-fid or 5-partite; lobes acute. Corolla infundibuliform; tube elongate, straight or incurved; limb 2-lipped, the lobes 5, rounded. Stamens inserted on the corolla-tube, 2 perfect, 2–3 barren; filaments flattened, geniculate; anthers usually applied to the stigma, the cells 2, divaricate, often confluent. Ovary linear, 1-celled; placentas intruded as far as the axis, then reflexed, bearing many ovules on their margins; style short or long; stigma when young oblique, peltate, notched on the lower margin, in age the upper margin usually produced, oblong, bifid. Capsule elongate, linear, sessile, opening loculicidally to the base; valves 2-partite the following season. Seeds ellipsoid, smooth, sometimes minutely umbonate; testa often striate, reticulate.—Distrib. Chiefly Indian; a few W. Malayan and Chinese; species about 35.

1. **Chirita hamosa,** *R. Br. in Benn. Pl. Jav. Rar.* (1838–1852) p. 117. Annual; stem 8–20 in. high, erect, sparsely hairy. Leaves opposite, subequal, 3–6 by 2–4 in., ovate or elliptic, acute, obscurely crenulate, thin, sparsely hairy on both sides, base rounded or subcordate; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long. Peduncles adnate to the petiole; pedicels $\frac{1}{5}$–$\frac{1}{4}$ in. long, hairy. Calyx $\frac{1}{4}$ in. long, divided almost to the base, hairy; tube $\frac{1}{20}$ in. long; segments linear, subacute. Corolla $\frac{1}{2}$ in. long; tube slender, nearly white; limb pale blue or somewhat rosy. Stigma 2-fid, elongate after flowering. Capsules $1\frac{1}{4}$–$3\frac{1}{2}$ in. long, linear, acute, often much curved, slender, pubescent. Seeds about $\frac{1}{30}$ in. long,

ellipsoid, apiculate, rugose. Fl. B. I. v. 4, p. 360; C. B. Clarke, in DC. Monogr. v. 5, part 1 (1883) p. 128. *Didymocarpus cristata*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 225; Dalz. & Gibs. p. 134.—Flowers: Sept.–Oct.

Rare. Without locality, *Dalzell* in Herb. Kew.! KONKAN: *Stocks*!, *Law*! S. M. COUNTRY: rocks near Párva Ghát, *Dalzell & Gibson*.—DISTRIB. Throughout India widely dispersed.

3. **KLUGIA,** Schlecht.

Herbs; stems rooting near the base, then erect, somewhat succulent, simple or branched, glabrous or pubescent. Leaves alternate (or sub-opposite, one of the pair reduced to an auricle), acuminate, unequal-sided, cordately auricled on one side of the unequal base, subentire or sinuate, many-nerved. Flowers in terminal or leaf-opposed many-flowered racemes; bracts minute or 0. Calyx campanulate, 5-angled or winged; segments 5, narrowly triangular. Corolla-tube cylindric; limb 2-lipped, the upper lip very short, erect, entire or emarginate, the lower lip broad, rounded or shortly 3-lobed. Perfect stamens 4, included, inserted above the middle of the tube; filaments slightly flattened; anthers approximated by pairs, 2-celled, the cells short, divaricate, soon confluent. Disk fleshy, annular or shortly cylindric. Ovary superior; placentas bearing ovules all over. Capsule included in the calyx, broadly ellipsoid, loculicidal, 2-valved. Seeds ellipsoid, truncate at both ends, reticulate.—DISTRIB. Species 4, of which 3 are Indian, the other Central American.

1. **Klugia Notoniana,** *A. DC. Prodr.* v. 9 (1845) p. 276. Annual, 1–2 ft. high; stem watery, stout, branched, shining, terete, glabrous or slightly hispid with a few short bristly hairs. Leaves few, 2–8 by 1–2½ in., ovate-oblong, very unequal-sided, acuminate, sinuate, often minutely denticulate, the smaller side acute at the base, the larger semicordate, auriculate, extending much lower down on the petiole, scabrous above, glabrous, pubescent or scabrous and paler beneath; lateral nerves very numerous, parallel, prominent beneath; petioles ½–1½ in. long, stout. Flowers numerous, in racemes reaching 4 in. long; rhachis pubescent on one side only; bracts $\frac{1}{10}$–$\frac{1}{8}$ in. long, linear-subulate, persistent; pedicels $\frac{1}{10}$–$\frac{1}{6}$ in. long, nodding, filiform, pubescent. Calyx ¼ in. long, usually glabrous; tube 5-winged, the upper wing extended into a large erect rounded crest; lobes $\frac{1}{10}$–$\frac{1}{8}$ in. long, narrowly triangular, acute. Corolla-tube ¼ in. long, white; limb bluish-purple; upper lip $\frac{1}{10}$ in. high, oblong, rounded; lower lip ½–¾ in. in diam., entire, blotched with yellow at the base. Capsules ⅛ in. in diam., concealed in the calyx. Seeds about $\frac{1}{40}$ in. long, oblong-ellipsoid. Fl. B. I. v. 4, p. 366; Wight, Icon. t. 1353; Trim. Fl. Ceyl. v. 3, p. 277; C. B. Clarke, in DC. Monogr. v. 5, part 1 (1883) p. 159; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 176. *Klugia scabra*, Dalz. & Gibs. Bo. Fl. (1861) p. 134.—Flowers: Sept.–Oct.

KONKAN: Wari Country, *Dalzell & Gibson*. DECCAN: Khandala, *Cooke*!; Wada Ghát below Mahableshwar, *Cooke*!, *Woodrow*!; Malkapur, *Woodrow*. S. M. COUNTRY: *Ritchie*, 1908!—DISTRIB. India (W. Peninsula); Ceylon.

I quite agree with Trimen (*l. c.*) that *Klugia scabra*, Dalz. & Gibs. Bo. Fl. (*l. c.*), is not deserving of even varietal rank.

4. **RHYNCHOGLOSSUM,** Blume (*Rhinchoglossum*).

Herbs, usually glabrous. Leaves alternate, elliptic, acuminate, unequal-sided, cordate on one side of the unequal base, subentire or sinuate. Flowers in long many-flowered racemes; bracts small. Calyx campanulate, 5-lobed. Corolla tubular; tube cylindric; mouth contracted; limb 2-lipped, the upper lip short, 2-fid, the lower longer, 3-lobed. Stamens 2, perfect, included; anthers connivent, 2-celled, the cells ellipsoid, subparallel, the slits ultimately subconfluent at the apex. Ovary ovoid, 1-celled; placentas much intruded, divided into 2 thick lamellæ bearing numerous ovules on all sides; style linear; stigma minutely 2-lobed. Capsule included in the calyx, ellipsoid, membranous. Seeds narrowly ellipsoid, smooth; testa minutely reticulate.—DISTRIB. Species 2 in India and Malaya.

1. **Rhynchoglossum obliquum,** *Blume, Bijdr.* (1826) p. 741 (*Rhinchoglossum*), VAR. **parviflora,** *C. B. Clarke, in DC. Monogr.* v. 5 (1883) p. 162. A succulent herb usually glabrous or nearly so, very variable in size, 2–20 in. high. Leaves 2–6 by 1–3 in., elliptic-oblong, acuminate, thinly membranous, usually glabrous, unequal-sided, the smaller side acute at the base, the larger semicordate, extending much lower on the petiole; lateral nerves numerous, parallel, curved, prominent beneath; petioles ½–1 in. long. Flowers in racemes reaching 4½ in. long, solitary or 2 together; rhachis glabrous; bracts at the base of the pedicels $\frac{1}{10}$ in. long, subulate; pedicels ⅛–¼ in. long, filiform, nodding. Calyx ⅕ in. long, divided about ½-way down or less; lobes triangular, acute. Corolla blue; tube ⅕ in. long; upper lip $\frac{1}{16}$ in. long, with 2 triangular acute lobes; lower lip ⅛ in. long, with 3 shallow obtuse lobes. Capsules ⅙ in. long, ovoid. Seeds narrowly ellipsoid, about $\frac{1}{60}$ in. long. Fl. B. I. v. 4, p. 367. *Rhynchoglossum obliquum,* DC. Prodr. v. 9 (1845) p. 274; Wight, Ill. v. 2, p. 182, t. 159 *bis,* fig. 7; C. B. Clarke, Comm. & Cyrt. Beng. t. 88; Woodr. in Journ. Bomb. Nat. v. 12 (1898) p. 176. *R. zeylanicum,* Hook. Bot. Mag. t. 4198.—Flowers: Oct.

KONKAN: elevated parts. *Dalzell*!; Dasgaon, *Woodrow*; Western Ghâts, *Woodrow*! DECCAN: Wada below Mahableshwar, *Woodrow*!; Pertabgarh Fort, on walls near the gate, *Woodrow*! KANARA: Kála naddi, *Ritchie,* 1909!—DISTRIB. Throughout India in and near the hills, common.

5. **EPITHEMA,** Blume.

Small succulent pubescent herbs; stem simple or branched. Leaves few or solitary; lower alternate; upper often opposite. Flowers small, in dense pedunculate scorpioid cymes; peduncles long, 1 or more from the upper axils, free or confluent with the petiole or leaf-base; bract large, solitary, 1-sided, hooded or subspathaceous; bracteoles small, narrow, or 0; pedicels very short. Calyx campanulate; lobes 5, acute, valvate in bud. Corolla small, blue or white, tubular, 2-lipped; lobes 5, slightly unequal. Stamens: 2 upper perfect; 2 lower reduced to staminodes; anthers cohering, 2-celled, cells short, divaricate, soon confluent. Ovary ovoid, 1-celled; placentas stalked, peltate, bearing ovules on all sides; style filiform; stigma small, subcapitate. Capsule globose, membranous, included in the calyx, dehiscing circumscissilely.

Seeds numerous, stipitate, oblong or ellipsoid, subacute at both ends, striate (often spirally).—DISTRIB. From India to the Philippines, Tropical Africa; species perhaps 6.

1. **Epithema carnosum,** *Benth. Scroph. Ind.* (1835) p. 57, VAR. **hispida,** *C. B. Clarke, in DC. Monogr.* v. 5 (1883) p. 178. Stem 2–12 in. high, slightly branched, erect, succulent, rough with bristly hairs. Leaves few (sometimes only 1), the upper opposite, nearly sessile, the lower alternate, petiolate, 1–6 in. long, nearly as broad as long, broadly elliptic or ovate, obtuse, more or less inciso-serrate, covered on both sides with bristly hairs; lower petioles 2–4 in. long. Flowers in close scorpioid cymes; peduncles 1–4 in. long, solitary or 2–5 together, terminal or axillary, rough with bristly hairs, free or racemosely (not fasciculately) confluent with the petiole or leaf-base; bract $\frac{1}{3}$–$\frac{3}{4}$ in. long, at the summit of the peduncle below the inflorescence, leafy, broadly ovate, cordate, cucullate, obtuse, dentate; pedicels 0–$\frac{1}{6}$ in. long. Calyx $\frac{1}{6}$–$\frac{1}{5}$ in. long, pubescent; lobes slightly shorter than the tube, triangular, acute, with a subulate point. Corolla blue, $\frac{1}{4}$–$\frac{1}{3}$ in. long, with a ring of hairs inside; tube longer than the subequal lobes. Capsules $\frac{1}{12}$ in. in diam., globose. Seeds scarcely $\frac{1}{30}$ in. long, with a long funicle, oblong, acute at both ends, spirally striate. Fl. B. I. v. 4, p. 369. *Epithema ceylanicum,* Wight, Ill. t. 159 *bis,* fig. 3; Icon. t. 1354 (*not* of Gardn.); Dalz. & Gibs. p. 135.

Rare; chiefly on the Southern Ghâts of the Presidency. Without locality in Herb. Kew., *Dalzell!* S. M. COUNTRY: Chorla Ghât, *Stocks!*—DISTRIB. India (W. Peninsula).

Several non-indigenous plants of the Order (chiefly Brazilian) are grown in gardens and conservatories, where they are very showy and ornamental. The following are the chief species grown, but several hybrids are being introduced:—

Gesneria Douglasii, Lindl. in Trans. Hort. Soc. v. 7 (1830) p. 62. A handsome herbaceous plant, a native of Brazil. Leaves 5–7 in a whorl, about 6 in. from the ground, ovate, crenate-serrate, ciliate, downy, with a fine gloss on each side. Corolla tubular, pink or orange, striped and bordered with blood-red spots. Dalz. & Gibs. Suppl. p. 65.

Achimines hirsuta, DC. Prodr. v. 7 (1838) p. 536. A native of Brazil, about 2 ft. high, hairy. Leaves ovate-oblong, coarsely serrate. Corolla reddish with yellow eye and spotted throat; limb flat, with rounded serrulate segments. *Achimines Skinneri,* Gordon, in Journ. Hort. Soc. v. 2 (1847) p. 293, t. 4, fig. 2; Dalz. & Gibs. Suppl. p. 65.

Sinningia tubiflora, Fritsch, in Engl. & Prantl, Pflanzenf. v. 4, 3 B (1894) p. 182. A fine plant 2 ft. or more high, a native of Brazil. Leaves 5 in. long, oblong-lanceolate, subacuminate, shortly petiolate, ciliate, green with darker markings. Corolla white or pale-yellow; tube $2\frac{1}{2}$ in. long. *Gloxinia tubiflora,* Hook. Bot. Mag. t. 3971. *Achimines tubiflora,* Britton, in Ann. N.Y. Acad. Sc. v. 7 (1893) p. 185; Woodr. Gard. in Ind. ed. 5, p. 406.

Sinningia speciosa, Hiern, in Kjoeb. Vidensk. Meddel. (1877-78) p. 91. A short-stemmed plant, a native of Brazil, with oblong velvety crenate leaves and violet-purple flowers. Woodr. Gard. in Ind. ed. 5, p. 407. *Gloxinia speciosa*, Lodd. Bot. Cab. v. 1 (1818) t. 28; Grah. Cat. p. 146; Dalz. & Gibs. Suppl. p. 65.

Nægelia zebrina, Regel, in Flora, v. 31 (1848) p. 249. A very showy plant about 2 ft. high, a native of Mexico. Leaves suborbicular, cordate, velvety, deep green, marbled. Flowers in racemes or panicles with long pedicels; corolla drooping, orange-scarlet above, pale-orange below, the segments of the limb almost equal, pale-orange spotted with red. Woodr. Gard. in Ind. ed. 5, p 406. *Gesneria zebrina*, Paxt. Mag. Bot. v. 8 (1841) p. 271; Graham, in Bot. Mag. t. 3940.

Gloxinia maculata, L'Hérit. Stirp. Nov. (1784) p. 149. A native of S. America, with simple spotted stems. Radical leaves 6 by 4 in., ovate, cordate, obtuse, doubly toothed, green and shining above, reddish beneath. Flowers in racemes; corolla large, pale-blue, widely tubular. Grows well in the Deccan if treated with care and flowers profusely in October and November. Woodr. Gard. in Ind. ed. 5, p. 408.

Episcia tesselata, Linden, ex Lemaire, Ill. Hortic. v. 16 (1869) sub t. 607. A herbaceous plant, a native of Peru, with subcordate petiolate leaves of a beautiful dark olive-green with a bronzy sheen above, vinous-red beneath. Flowers numerous, aggregated in axillary fascicles, subsessile, yellow. *Centrosolenia bullata*, Lemaire, Ill. Hortic. v. 16 (1869) t. 607; Woodr. Gard. in Ind. ed. 5, p. 407.

Episcia fulgida, Hook. f. in Bot. Mag. v. 30 (1874) t. 6136. A handsome herbaceous plant, a native of Colombia. Leaves ovate, subcordate, crenate, ciliate, richly marbled. Flowers axillary, solitary, on long pedicels; corolla bright-scarlet with a long tube. *Cyrtodeira fulgida*, Linden, ex André, Illustr. Hortic. v. 20 (1873) t. 131; Woodr. Gard. in Ind. ed. 5, p. 408.

Order XCIV. BIGNONIACEÆ.

Trees or shrubs. Leaves opposite, 1–3 times unequally pinnate or sometimes undivided. Flowers hermaphrodite, irregular, in racemes or panicles usually terminal; bracts 0. Calyx gamosepalous, campanulate or spathaceous; lobes 2–5 or 0. Corolla 2-lipped, tubular-ventricose; lobes 5, subequal, imbricate in bud. Stamens 4, didynamous, often with an imperfect (in *Oroxylum* a perfect) fifth inserted where the corolla-tube is suddenly swollen; anthers 2-celled, included or shortly exserted; cells elliptic or oblong, parallel or divaricate, with longitudinal dehiscence. Disk usually thick or annular. Ovary subsessile, 2-celled; ovules numerous, in many rows (rarely 1–2 rows), anatropous; style long, glabrous; stigma of 2 elliptic lobes. Capsules mostly elongate, loculicidally or septicidally 2-valved; septum enlarging in fruit, deciduous with the placentas. Seeds compressed, discoid (rarely subtrigonus), usually prominently winged; albumen 0.—Distrib. Throughout the Tropics of the whole world, largely in Trop. America, a few in the warm temperate zones of both hemispheres; genera about 105; species about 550.

Perfect stamens 5 ..... 1. OROXYLUM.
Perfect stamens 4.
  Leaves simple ..... 2. TECOMELLA.
  Leaves pinnate.
    Capsule not winged, cylindric or subquadrangular.
      Calyx spathaceous, cleft to the base on one side in flower; corolla-tube not ventricose... 3. DOLICHANDRONE.
      Calyx not spathaceous; corolla-tube ventricose.
        Capsule with a flat or angular dissepiment. 4. HETEROPHRAGMA.
        Capsule with a cylindric spongy dissepiment.
          Ovules 2-seriate in each cell; seeds ridged, sunk in deep pits in the placenta ..... 5. STEREOSPERMUM.
          Ovules many-seriate in each cell; seeds flat, not ridged, not sunk in the placenta ..... 6. RADERMACHERA.
    Capsule with double wings on the margins, oblong, compressed ..... 7. PAJANELIA.

1. **OROXYLUM,** Vent.

A glabrous usually small tree. Leaves opposite, large, 2–3-pinnate; leaflets entire, ovate. Flowers in long terminal racemes. Calyx large, campanulate, coriaceous; limb truncate or obscurely toothed, persistent. Corolla large, campanulate, purplish or white; lobes 5, round, crisped, toothed, subequal. Stamens 5, perfect, exserted; filaments straight, 4 of them subequal, the fifth one shorter; anthers 2-celled, the cells parallel, oblong. Disk large, cushion-like. Ovary 2-celled, subsessile, contracted below; ovules numerous, many-seriate; style long; stigma of 2 large blades. Capsule very large, broadly linear, strongly compressed parallel to the septum, 2-valved, opening septifragally. Seeds many, thinly discoid, with a broad hyaline wing.—DISTRIB. India, Ceylon, Malaya, Cochin-China, Ava; species 1.

1. **Oroxylum indicum,** *Vent. Dec. Gen. Nov.* (1808) p. 8. A small tree 25–40 ft. high, branched at top; bark light-brown, soft, with green juice and often with numerous corky lenticels. Leaves very large, 3–5 ft. long, 2–3-pinnate with opposite pinnæ; rhachis very stout, cylindric; leaflets 2–4 pairs, $2\frac{1}{2}$–5 by $1\frac{1}{2}$–4 in., ovate or elliptic, acuminate, glabrous, base rounded or sometimes cordate; petiolules of the lateral leaflets $\frac{1}{4}$–$\frac{5}{8}$ in. long. Flowers numerous, fetid, in large erect racemes 1–2 ft. long or even more; pedicels $\frac{1}{4}$–$1\frac{1}{4}$ in. long. Calyx 1 by $\frac{3}{4}$ in., leathery, oblong-campanulate, glabrous. Corolla usually lurid-purple, reaching 4 in. long, fleshy; lobes about $1\frac{1}{2}$ in. long with crisped margins. Stamens 5, slightly exserted beyond the corolla-tube, one of them a little shorter than the other 4; filaments cottony at the base. Capsules 1–3 ft. by 2–$3\frac{1}{2}$ in., straight, tapering to both ends, flat, hardly $\frac{1}{3}$ in. thick, acute; valves semi-woody. Seeds very numerous, $2\frac{1}{2}$ in. long, winged all round except at the base. Fl. B. I. v. 4, p. 378; Trim. Fl. Ceyl. v. 3, p. 281; Talb. Trees, Bomb. ed. 2, p. 255; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 5, p. 495. *Bignonia indica,* Linn. Sp. Pl. (1753) p. 625; Grah. Cat. p. 125; Bedd. For. Man. in Flor. Sylvat. p. clxviii. *Calosanthes indica,* Blume, Bijdr. p. 761; Wight, Icon. t. 1337–38; Dalz. & Gibs. p. 161.—Flowers: May–July. VERN. *Tetu.*

KONKAN: *Stocks*!; Salsette jungles and throughout the Konkan and Ghâts, *Dalzell & Gibson*; Western Ghâts, *Woodrow*. KANARA: Kâla naddi, *Ritchie*, 1883!; very common in the evergreen forests near the Nilkund Ghât, *Talbot*.—DISTRIB. Throughout India except in the western drier area; Ceylon, Malaya, Cochin-China, Ava.

The root-bark is much used in medicine by the natives of India as a tonic and astringent in diarrhœa and dysentery. Ground to powder and mixed with turmeric it is used in Bombay as an application to sore backs of horses and bullocks. See Watt, Dict. Econ. Prod. l. c.

2. **TECOMELLA,** Seem.

A glaucescent shrub or small tree. Leaves usually opposite, simple, oblong, obtuse, entire. Flowers in terminal racemes or panicles. Calyx tubular-campanulate, subequally 5-toothed. Corolla tubular-campanulate, ventricose with a wide mouth; lobes rounded, subequal, imbricate. Stamens exserted; anther-cells divergent and pendulous. Disk cupular. Ovary oblong; ovules numerous in each cell. Capsule linear-oblong, more or less compressed at right angles to the septum; valves opening loculicidally. Seeds discoid, winged, the wing absent at the base of the seed and very narrow at its apex.—DISTRIB. India, Beluchistan, Arabia.

1. **Tecomella undulata,** *Seem. in Ann. & Mag. Nat. Hist.* ser. 3, v. 10 (1862) p. 30. A shrub or small tree with drooping branches and stellately grey-tomentose innovations, otherwise glabrous. Leaves simple, 2–5 by $\frac{3}{8}$-$1\frac{1}{4}$ in., narrowly oblong, obtuse, entire with undulate margins. Flowers inodorous, in corymbose few-flowered racemes terminating short lateral branches; pedicels $\frac{1}{4}$-$\frac{1}{2}$ in. long. Calyx $\frac{3}{8}$-$\frac{7}{16}$ in. long, campanulate; lobes $\frac{1}{8}$ in. long, broadly ovate, obtuse, mucronate. Corolla $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, orange-yellow, campanulate, veined; lobes 5, subequal, rounded. Stamens exserted; filaments glabrous. Stigma 2-lamellate; lobes spathulate-oblong, rounded. Capsules 8 by $\frac{3}{4}$ in., slightly curved, linear-oblong, acute, smooth; valves thin. Seeds (including the wing) 1 by $\frac{3}{8}$ in.; wing very narrow round the apex of the seed, absent at its base. K. Schum. in Engl. & Prantl, Pflanzenf. v. 3 B, p. 239. *Tecoma undulata*, G. Don, Gen. Syst. v. 4 (1837) p. 223; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 378; Dalz. & Gibs. p. 161; Aitch. Pb. & Sind Pl. p. 110; Talb. Trees, Bomb. ed. 2, p. 256; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 6, part 4, p. 1. *Bignonia undulata*, Sm. Exot. Bot. v. 1, p. 35, t. 19; Grah. Cat. p. 124.—Flowers: Feb.-Apr. VERN. *Rakta-rohida*; *Lohero*.

Dalzell without locality, in Herb. Kew.! DECCAN: Khandesh, *Graham*; W. Khandesh, *Dalzell & Gibson, Woodrow*. GUJARAT: Banás river, *Vaupell* ex *Graham*, *Dalzell & Gibson*. SIND: *Stocks* ex *Aitchison*.—DISTRIB. India (W. Peninsula, Panjáb, Rajputana); Beluchistan, Arabia.

Well worthy of cultivation for its elegant foliage and showy flowers. The bark is employed in Sind as a remedy for syphilis; the leaves are eaten by cattle; the wood is strong, tough, and durable, takes a fine polish, and is highly prized for furniture and carved work. See Watt, Dict. Econ. Prod. l. c.

3. **DOLICHANDRONE,** Seem.

Trees, glabrous or tomentose. Leaves opposite, 1-pinnate. Flowers in terminal racemes or panicles. Calyx spathaceous, cleft to the base on one side. Corolla more or less tubular; lobes of limb 5, subequal,

round, crisped, crenate or incised. Stamens 4, didynamous, included; anthers glabrous, the cells oblong, more or less parallel. Disk annular, cushion-like. Ovary sessile; ovules numerous, usually many-seriate; style long; stigma 2-lobed. Capsule large, subterete or compressed, loculicidally 2-valved, imperfectly 4-celled. Seeds thinly discoid, with a broad wing at each end.—DISTRIB. India, China, Ceylon, Malaya, Tropical Africa, Australia; species about 20.

Leaflets reaching 3½ in. long, elliptic, acuminate; petiolules of lateral leaflets ¼–½ in. long; capsule slightly compressed, speckled ..... 1. *D. crispa.*
Leaflets reaching 1½ in. long, suborbicular; petiolules of lateral leaflets 0–$\frac{1}{16}$ in. long; capsule much compressed, not speckled ... 2. *D. falcata.*

1. **Dolichandrone crispa,** *Seem. in Journ. Bot.* v. 8 (1870) p. 381. A deciduous tree 35–60 ft. high; young parts velvety-pubescent. Leaves opposite, pinnate, 8–12 in. long; leaflets 2–3 pairs and an odd one, 1½–3½ by $\frac{7}{8}$–1¾ in., elliptic, acuminate (sometimes, but rarely, obtuse), glabrous, entire, tapering and often unequal-sided at the base; main nerves 4–6 pairs with reticulate venation between; petiolules of the lateral leaflets ¼–½ in. long, those of the terminal leaflets much longer. Flowers in 1–8-flowered corymbose racemes; pedicels ½–1½ in. long. Calyx ¾–1 in. long, puberulous when young, at length glabrous. Corolla white, fragrant; tube 1–2 in. long, ⅛–$\frac{1}{5}$ in. in diam., cylindric; limb reaching 2 in. across the mouth when expanded; lobes rounded, crisped-crenate. Capsules reaching as much as 18 in. long by ⅔ in. wide, slightly compressed, arcuate, speckled, smooth; valves woody. Seeds 1¼ by ¼ in. (including the wing), subrectangular, with broad membranous wings at the ends. Fl. B. I. v. 4, p. 379; Talb. Trees, Bomb. ed. 2, p. 257. *Bignonia crispa*, Buch.-Ham. in Roxb. Fl. Ind. v. 3, p. 103; Grah. Cat. p. 125. *Spathodea crispa*, Wall. Cat. 6515; Dalz. & Gibs. p. 160.—Flowers: Mar.–Oct. VERN. *Gudmurki.*

S. M. COUNTRY: Gokak, *Ritchie*, 1123!; Belgaum districts, *Ritchie*, 1123!; Sutguti (Belgaum districts), *Talbot*; Duddi on the Gatpraba river, *Law* ex *Graham*; Kuputguda hill (Dharwar districts), *Talbot*.—DISTRIB. India (W. Peninsula).

2. **Dolichandrone falcata,** *Seem. in Journ. Bot.* v. 8 (1870) p. 381. A deciduous tree 20–50 ft. high, the young parts pubescent or shortly villous. Leaves simply pinnate, 3–6 in. long; leaflets opposite, ½–1½ by $\frac{7}{16}$–1½ in., suborbicular or obovate, sometimes very shortly acuminate (the terminal leaflet rather larger than the lateral ones), pubescent or glabrous, base cuneate or rounded, usually unequal-sided; main nerves about 4 pairs, conspicuous beneath; petiolules of the lateral leaflets 0–$\frac{1}{16}$ in. long. Flowers in terminal few-flowered racemes; pedicels ½ in. long. Calyx ½–¾ in. long, pubescent, with a short stout mucro at the apex. Corolla white, 1 in. long or even more; tube very narrow (about $\frac{1}{10}$ in.) at its base, gradually enlarging upwards; lobes of the limb obovate-oblong with crisped undulate margins. Capsules flat, much falcately curved, 10–18 in. long by ¾ in. wide, glabrous. Seeds 1 in. long by ¼ in. broad, rectangular, winged at the two ends. Fl. B. I. v. 4, p. 380; Talb. Trees, Bomb. ed. 2, p. 257; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 3, p. 174. *Dolichandrone Lawii*, Seem. in Journ. Bot. v. 8 (1870) p. 380; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 380. *Spathodea falcata*, Wall. Cat. 6517; Dalz. & Gibs. p. 160; Bedd. Fl. Sylvat. t. 71. *Bignonia spathacea*, Roxb. Cor.

Pl. v. 2, p. 24, t. 144 (*excluding capsules*); Grah. Cat. p. 125.—Flowers: Mar.–May. VERN. *Medasinghi.*

KONKAN: deciduous forests, *Talbot*; Vale of Nagotna river above the village, *Graham.* DECCAN: Poona, *Woodrow*; Chattersinghi hill near Poona, *Kanitkar*!; Khandala, *Graham, Bhiva*! S. M. COUNTRY: Belgaum north, *Ritchie*, 1125!; Duddi, *Law* ex *Graham.* KANARA: N. Kanara, in deciduous forests, *Talbot.*

I have followed Talbot (who from his knowledge of the tree in the southern districts of the Presidency, where it is tolerably abundant, is in a position to form an accurate judgment respecting it), in uniting *D. Lawii*, Seem., with *D. falcata.*—DISTRIB. India (W. Peninsula).

The wood is hard and seasons well. It is used for building and agricultural purposes.

4. **HETEROPHRAGMA,** DC.

Trees. Leaves large, 1-pinnate. Flowers large, in terminal velvety-tomentose panicles. Calyx ovoid, closed when young, irregularly 3–5-lobed in flower. Corolla tubular-ventricose, rosy, white or yellow; lobes 5, rounded, subequal. Stamens 4, didynamous, included; anthers glabrous, the cells linear-oblong, diverging. Disk cushion-shaped. Ovary sessile; ovules numerous, many-seriate on each placenta; style long; stigma 2-lobed. Capsule elongate, cylindric or more or less compressed, falcate or twisted, loculicidally 2-valved with a flat or 4-angled dissepiment. Seeds compressed, with a membranous wing at each end.—DISTRIB. Species 5, of which 3 are Indian, the others African.

1. **Heterophragma Roxburghii,** *DC. Prodr.* v. 9 (1845) p. 210. A large tree with dark-brown bark. Leaves simply pinnate, 1–2 ft. long, tomentose when young, afterwards glabrous, usually crowded near the ends of the branches; leaflets 3–5 pairs and an odd one, 2–5 by $1\frac{1}{4}$–2 in., elliptic-oblong, obtuse, sometimes with a short acumination, entire or serrulate, often unequal-sided at the base; petiolules of the lateral leaflets 0–$\frac{1}{4}$ in. long. Flowers fragrant, in large, terminal, many-flowered densely fulvous-tomentose panicles; pedicels short, stout. Calyx $\frac{1}{2}$–$\frac{3}{4}$ in. long, densely tomentose outside, clothed inside with long silky tawny hairs, irregularly lobed $\frac{1}{3}$–$\frac{1}{2}$-way down, or on one side more deeply divided, or obscurely 2-lipped. Corolla reaching 2 in. long or more, pale rose-colored or white, often with a pink margin; tube pubescent outside when young, usually becoming glabrous; mouth of the limb 2 in. across, the lobes about $\frac{1}{2}$ in. long with crisped margins. Filaments densely woolly at the very base, otherwise glabrous. Capsules straight, $\frac{1}{2}$ in. thick, 8–12 by $1\frac{1}{2}$–2 in., linear, pointed, velvety when young, afterwards glabrous; dissepiment 4-winged, making the capsule 4-celled. Seeds $1\frac{1}{2}$ by $\frac{3}{4}$–1 in. Fl. B. I. v. 4, p. 381; Dalz. & Gibs. p. 160; Bedd. For. Man. in Flor. Sylvat. p. clxix; Talb. Trees, Bomb. ed. 2, p. 257; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 4, p. 227. *Bignonia quadrilocularis*, Roxb. Cor. Pl. v. 2, p. 24, t. 145; Grah. Cat. p. 125.—Flowers: Feb.–Apr. VERN. *Varas.*

KONKAN: Elephanta, *Graham*; Matheran, *Cooke*!; near Chowk plateau, Matheran, *H. M. Birdwood.* DECCAN: near Poona, *Woodrow*!; Ghâts, *Dalzell*!; Khandesh, *Graham*; Mahableshwar near the Yenna Waterfall, *Graham, Cooke*!; Kadakvasla, *Cooke*! S. M. COUNTRY: Padshapur jungles, *Dr. Lush* ex *Graham*; Turkeri near Belgaum, *Ritchie*, 1122!—DISTRIB. India (Central Provinces, W. Peninsula).

5. **STEREOSPERMUM,** Cham.

Trees. Leaves opposite, imparipinnate. Flowers in terminal panicles. Calyx campanulate, 2–5-lobed or 5-toothed. Corolla tubular-campanulate, curved, often pubescent or woolly outside, bearded inside on the lower, glabrous on the upper side; limb 5-lobed, sub-bilabiate, the 2 upper lobes more or less connate. Stamens 4 (with a rudimentary 5th), didynamous, included; anthers glabrous, the cells much divergent. Disk cupular, fleshy. Ovary elongate, 2-celled; ovules many, 2-seriate in each cell, horizontal. Capsule linear, cylindric or 4-gonous, often spirally twisted, 2-valved; valves coriaceous; dissepiment at length free, spongy, filling the whole capsule. Seeds numerous, with a membranous wing at each end; nucleus thick, with a transverse groove on one side and a prominent ridge on the other, which fits into a deep pit in the placenta.—DISTRIB. Tropical Asia and Africa; species about 12.

Branches of the panicle slender, glabrous; corolla under 1 in. long, yellow tinged with purple; capsule subquadrangular ...	1. *S. chelonoides.*
Branches of the panicle short, viscidly hairy; corolla dull-purple, 1 in. and more long; capsule cylindric	2. *S. suaveolens.*

1. **Stereospermum chelonoides,** *DC. Prodr.* v. 9 (1845) p. 210. A large deciduous tree, 30–60 ft. high, with many spreading branches, glabrous or nearly so; bark thick, yellowish. Leaves 1-pinnate, 12–18 in. long; leaflets 3–5 pairs and an odd one, 4–5 by 1–2 in., elliptic, caudate-acuminate, glabrous, base acute or rounded, often unequal-sided; main nerves 8–10 pairs with reticulate venation between; petiolules of the lateral leaflets $\frac{3}{8}$–$\frac{1}{2}$ in. long. Flowers fragrant, in lax drooping terminal panicles with articulated slender glabrous branches. Calyx $\frac{1}{4}$ in. long, campanulate, glabrous, usually purple, shortly 3–5-toothed. Corolla $\frac{3}{4}$ in. long, yellow, veined and tinged with reddish-purple, more or less pubescent outside, bearded inside on the lower, glabrous on the upper side; lobes of the limb rounded, crisped. Filaments with a short tuft of woolly hairs at the very base, otherwise glabrous. Capsules 1–2 ft. by $\frac{1}{2}$ in., subquadrangular, curved, pointed, more or less spirally twisted, often dotted with white specks; dissepiment subcylindric, brown, with open notches to receive the seeds. Seeds 1–$1\frac{1}{4}$ in. long, readily splitting along the transverse furrow. Fl. B. I. v. 4, p. 382; Wight, Icon. t. 1341; Bedd. Flor. Sylvat. t. 72; Trim. Fl. Ceyl. v. 3, p. 283; Talb. Trees, Bomb. ed. 2, p. 258; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 6, part 3, p. 366. *Bignonia chelonoides,* Linn. f. Suppl. (1781) p. 282; Grah. Cat. p. 125. *Heterophragma chelonoides,* Dalz. & Gibs. p. 160.—Flowers: Apr.–June VERN. *Padal.*

Dalzell without locality in Herb. Kew.! KONKAN: Bankot, *Woodrow*; throughout the Konkan in moist forests, *Talbot.* DECCAN: Khandala, *Woodrow*; Lanoli Grove, *Woodrow*; ravine near Pár, *Graham.* S. M. COUNTRY: Belgaum, *Ritchie,* 1824! KANARA: N. Kanara, in evergreen and deciduous moist forests, *Talbot*—DISTRIB. Throughout moister India; Ceylon, Ava.

The leaves, roots, and flowers have some repute in native medicine. See Watt, Dict. Econ. Prod. l. c.

2. **Stereospermum suaveolens,** *DC. Prodr.* v. 9 (1845) p. 211. A deciduous tree 30–60 ft. high, more or less pubescent; young parts

viscous-hairy. Leaves 1–2 ft. long, simply pinnate; leaflets 3–4 pairs and an odd one 3–6 by 2–3 in., broadly elliptic, usually acuminate, often serrulate, rough above, pubescent beneath, base usually rounded and unequal-sided; main nerves 6–8 pairs with reticulate venation between; petiolules of the lateral leaflets $\frac{1}{10}$ in. or less long. Flowers sweetly fragrant, in large lax trichotomous viscidly-hairy panicles. Calyx $\frac{3}{8}$ in. long, campanulate, viscidly hairy; lobes 3–5, short, broad. Corolla 1–1½ in. long, infundibuliform, dull purple, pubescent outside, bearded inside on the lower, glabrous on the upper side; limb oblique, 2-lipped; lobes rounded, crisped-crenate, the 3 lower lobes longer than the 2 upper. Filaments without a tuft of hairs at the base. Capsules 1–2 ft. by $\frac{2}{3}$ in., straight, cylindric, slightly ribbed, somewhat rough with elevated whitish specks; valves thick, hard. Seeds 1¼ by ½ in., with a long membranous wing at each end, the nucleus furrowed across the middle, sunk into the notches of the cylindric brown spongy dissepiment. Fl. B. I. v. 4, p. 382; Wight, Icon. t. 1342; Bedd. For. Man. in Flor. Sylvat. p. clxix; Talb. Trees, Bomb. ed. 2, p. 258; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 6, part 3, p. 367. *Bignonia suaveolens*, Roxb. Fl. Ind. v. 3, p. 104; Grah. Cat. p. 125. *Heterophragma suaveolens*, Dalz. & Gibs. p. 161.—Flowers: Mar.–Apr. VERN. *Parul.*

Dalzell without locality in Herb. Kew.! KONKAN: Uran in Bombay harbour, *Dalzell*! DECCAN: Poona (planted), *Woodrow*; Párghát below Mahableshwar, *Graham*. S. M. COUNTRY: dry forests of the Dharwar districts, *Talbot*. KANARA: Kála naddi, *Ritchie*, 1882!—DISTRIB. Throughout India in drier localities than *S. chelonoides*; often planted.

6. **RADERMACHERA,** Zoll. & Moritz.

Trees. Leaves opposite, 1–3-pinnate. Flowers in terminal panicles. Calyx truncate or obtusely lobed. Corolla infundibuliform or campanulate, not bearded within on the lower side; limb 5-lobed, sub-bilabiate, the 2 upper lobes more or less connate. Stamens 4 (with a rudimentary 5th), didynamous, included; anthers glabrous, the cells much divergent. Disk cupular, fleshy. Ovary elongate; ovules numerous, many-seriate in each cell, horizontal. Capsule linear, cylindric, 2-valved, often spirally twisted; valves coriaceous or woody; dissepiment at length free, spongy, thick, filling the whole capsule. Seeds numerous, small, with a membranous wing at each end; nucleus thin, flat, not ridged, resting in a very slight depression, but not sunk in the septum; cotyledons flat, not folded.—DISTRIB. India, Singapore, Java, Philippines; species about 8.

This genus, established in 1854 by Zollinger & Moritz (Zoll. Syst. Verz. Ind. Archip. p. 53), has been placed under *Stereospermum* in the 'Genera Plantarum' of Bentham & Hooker, but many authors are now agreed as to the advisability of again separating the two genera. Mr. W. B. Hemsley (Hook. Icon. Pl. t. 2728) points out the grounds which render this separation desirable. In *Stereospermum* the ovules are arranged in 2 rows in each cell, the embryo is folded, and the seeds in consequence ridged on one side, fitting into deep pits in the placenta. In *Radermachera* the ovules are many-seriate [8-seriate according to Bureau (Adansonia, v. 2, p. 192)], the seeds are flat, not ridged, resting in very slight depressions, but not at all immersed in the placenta, while the cotyledons are not folded.

1. **Radermachera xylocarpa,** *K. Schum. in Engl. & Prantl, Pflanzenf.* v. 4, 3 B (1895) p. 243. A middle-sized deciduous tree with light-grey bark. Leaves 2-pinnate, 1–4 ft. long; main rhachis angular; leaflets 2–4 pairs with an odd one, 2–3 by 1–1½ in., elliptic-oblong, acute or acuminate, entire, glabrous when mature, reticulately veined, base acute or rounded, often unequal-sided; petiolules of lateral leaflets 0–¼ in. long. Flowers fragrant, appearing after the leaves, in dense compound erect somewhat rigid pubescent panicles. Calyx ½ in. long, pubescent outside; lobes 3–5, irregular, short, broad. Corolla 1½–2 in. long, white tinged with yellow, glabrous on both sides; tube narrow within the calyx, then much swollen upwards; limb somewhat oblique, with subequal rounded crisped lobes. Filaments hairy at the base. Disk cupular, fleshy. Ovary elongate; ovules numerous, many-seriate in each cell; stigma 2-lamellate. Capsules 1–3 ft. long, slightly curved, rough with numerous large irregular hard tubercles; valves woody, 1–1½ in. broad; dissepiment cylindric, bearing the seeds on shallow depressions. Seeds 1¼ in. long (including the membranous wing), thinly discoid, ¼ in. broad, *Stereospermum xylocarpum*, Benth. & Hook. Gen. Pl. v. 2, p. 1047; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 383; Talb. Trees, Bomb. ed. 2, p. 258; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 6, part 3, p. 367. *Bignonia xylocarpa*, Roxb. Fl. Ind. v. 3, p. 108; Wight, Icon. tt. 1335–36; Grah. Cat. p. 125; Dalz. & Gibs. p. 159; Bedd. Flor. Sylvat. t. 70.—Flowers: Apr.–May. VERN. *Kharsing*; *Kadashing*.

KONKAN: hills about Nagotna, *Giberne* ex *Graham*; jungles about Ratnagiri, *Elphinstone* ex *Graham*. DECCAN: Dang jungles in Khandesh, *Graham*; Párghát, *Giberne* ex *Graham*; Thal Ghát, *Graham, Dalzell & Gibson*. S. M. COUNTRY: Belgaum, *Ritchie*, 469*!*; Rámghát, *Ritchie*, 469*!*; common in the dry forests of the Dharwar districts, *Talbot*.—DISTRIB. India (W. Peninsula, extending north to the Satpuras).

The wood is good and handsome, tough and elastic, taking a good polish; it deserves to be better known and to be in more general use for cabinet-work (*Gamble*). From the yellow resinous substance which often fills the pores of the heart wood an oily extract is obtained which is employed in cutaneous diseases (*Dalzell & Gibson*). Roxburgh says that one of the capsules would make a *dangerous bludgeon*.

7. PAJANELIA, DC.

A large glabrous tree. Leaves large, 1-pinnate; leaflets numerous, entire. Flowers large, in terminal thyrsoid panicles. Calyx large, ovoid, closed in bud, swollen and campanulate in flower, 5-lobed. Corolla large, tubular-ventricose; lobes 5, subequal, crisped. Stamens 4, didynamous; anthers glabrous, the cells linear, divergent. Disk broad. Ovary sessile; ovules many-seriate on each placenta; style long; stigma 2-lobed. Capsule large, narrowly oblong, compressed, winged, loculicidally 2-valved. Seeds compressed, with a membranous wing at each end and sometimes with a small wing on one or both of the long sides.—DISTRIB. East Indies; species 1.

1. **Pajanelia multijuga,** *DC. Prodr.* v. 9 (1845) p. 227. A glabrous tree 30–60 ft. high. Leaves imparipinnate, 1½–3 ft. long; rhachis angular; leaflets 9–12 pairs and an odd one, 4–8 by 1½–3 in., ovate or elliptic, acute or acuminate, glabrous, entire, very unequal-sided at the

base; petiolules of the lateral leaflets $\frac{1}{8}$–$\frac{1}{6}$ in. long. Flowers in large robust erect panicles 12–18 in. long. Calyx 1–1$\frac{1}{2}$ in. long, ovoid, glabrous, divided rather less than $\frac{1}{2}$-way down; lobes usually acute. Corolla with dull-purple tube and yellow lobes, 2$\frac{1}{2}$–4 in. long, pubescent outside in the upper part; tube narrow below, swollen above; lobes rather more than $\frac{1}{2}$ as long as the tube, obovate-oblong, rounded and incised at the apex. Filaments glabrous at the base. Capsules 12–20 by 2$\frac{1}{2}$–3$\frac{1}{2}$ in., straight, compressed, 2-winged on each margin, glabrous, oblong or oblong-obovate, pointed. Seeds compressed, $\frac{3}{4}$ by $\frac{1}{4}$–$\frac{5}{8}$ in., winged at the two ends and often with a small wing on one or both of the long sides. Bureau, Monog. Bignon. (1864) t. 20; Jackson, in Index Kewen. v. 2, p. 403. *Panjanelia Rheedei*, Wight, Icon. (1850) tt. 1343–44. *Pajanelia Rheedei*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 384; Bedd. For. Man. in Flor. Sylvat. p. clxix; Talb. Trees, Bomb. ed. 2, p. 259; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 6, part 1, p. 4. *Pajanelia longifolia*, K. Schum. in Engl. & Prantl, Pflanzenf. v. 4, 3 B (1895) p. 244. *Bignonia longifolia*, Willd. Sp. Pl. v. 3, p. 306.—Flowers: cold season. VERN. *Aminge*; *Doundi*.

In the Bombay Presidency apparently confined to Kanara, where (*fide* Talbot) it occurs in the moist forests of N. Kanara along the banks of nálas in the Yellapur taluka.—DISTRIB. India (Khasia hills and Sylhet, W. Peninsula, Birma, the Andamans).

The wood is excellent and deserves to be better known; it is used in the Andamans, where the tree grows to a large size, for canoes (*Gamble*).

The following non-indigenous species, not belonging to any of the foregoing genera, are grown throughout the Presidency as ornamental plants. Most of them are characterised by large and handsome flowers:—

Millingtonia hortensis, Linn. f. Suppl. (1781) p. 291. A tall handsome tree of rapid growth with corky bark (hence often called the *Indian Cork-tree* by Anglo-Indians), strikingly beautiful dark green foliage and white fragrant flowers with long slender corolla-tubes. It is believed to be indigenous in Birma and the Malay Archipelago, but is extensively planted in avenues and gardens throughout India. It flowers Oct.–Dec., but does not ripen seed in W. India, and is propagated by suckers from the roots. Fl. B. I. v. 4, p. 377; Dalz. & Gibs. Suppl. p. 55; Woodr. Gard. in Ind. ed. 5, p. 411; Talb. Trees, Bomb. ed. 2, p. 256; Watt, Dict. Econ. Prod. v. 5, p. 247. *Bignonia suberosa*, Roxb. Cor. Pl. v. 3, p. 11, t. 214; Grah. Cat. p. 126.—VERN. *Akasnim*; *Kavla-nim*.

Bignonia magnifica, Bull, in Gard. Chron. v. 12 (1879) p. 72. A free-growing plant of scandent habit, recently introduced from B. Columbia. The flowers, which are produced in large branching panicles, are of great size, about 3$\frac{1}{2}$ in. across, ranging from delicate mauve to rich purplish crimson, relieved by a conspicuous throat of light primrose color. Woodr. Gard. in Ind. ed. 5, p. 410.

Bignonia incarnata, Aubl. Hist. Pl. Guian. v. 2 (1775) p. 645, t. 261. A scandent shrub with smooth shining ternate leaves (the terminal leaflet of the upper leaves generally transformed into a tendril). Corolla 2½ in. long, 1¼ in. wide at the mouth, pale-lilac veined with deep-purple; the tube white inside. It is a native of B. Guiana and is propagated by layering. Woodr. Gard. in Ind. ed. 5, p. 410, A.

Bignonia unguis-cati, Linn. Sp. Pl. (1753) p. 623. A very beautiful climber which clings to stone work by small hooked tendrils. It bears a profusion of bright yellow flowers for a short time during the hot season. One plant, a very large one, used to adorn the north side of the main building of the College of Science, Poona. *Bignonia gracilis*, Lodd. Bot. Cab. (1831) t. 1705; Woodr. Gard. in Ind. ed. 5, p. 409; Dalz. & Gibs. Suppl. p. 56.

Tecomaria capensis, Spach, Hist. Veg. Phan. v. 9 (1840) p. 137. A scandent shrub with pinnate leaves and dense racemes of orange-red flowers 2 in. long, with a long arcuate corolla-tube, a native of the Cape of Good Hope. *Tecoma capensis*, Lindl. Bot. Reg. t. 1117; Dalz. & Gibs. Suppl. p. 55.

Pandorea jasminoidea, K. Schum. in Engl. & Prantl, Pflanzenf. v. 4, 3 B (1894) p. 230. A scandent shrub a native of New Holland, becoming common about bungalows. It has pale bluish flowers. *Tecoma jasminoides*, Lindl. Bot. Reg. (1837) t. 2002; Dalz. & Gibs. Suppl. p. 56; Woodr. Gard. in Ind. ed. 5, p. 411.

Pyrostegia ignea, Presl, Bot. Bemerk. (1844) p. 93. A scandent shrub a native of Brazil. The lower leaves are 3-foliolate, the terminal leaflet transformed into a tendril in the upper leaves. The flowers are orange-red, 2½ in. long, with a long corolla-tube, arranged in terminal racemes. *Bignonia venusta*, Ker-Gawl, Bot. Reg. (1817) t. 249; Dalz. & Gibs. Suppl. p. 56; Woodr. Gard. in Ind. ed. 5, p. 410.

Campsis radicans, Seem. Journ. Bot. v. 5 (1867) p. 372. A shrubby plant with red flowers, a native of N. America. It is apt to produce long trailing branches in a rich soil (*Woodrow*). *Tecoma radicans*, Juss. Gen. (1789) p. 139; Dalz. & Gibs. Suppl. p. 55; Woodr. Gard. in Ind. ed. 5, p. 411. *Bignonia radicans*, Linn. Sp. Pl. (1753) p. 624; Bot. Mag. (1799) t. 485.

Stenolobium stans, Seem. Journ. Bot. v. 1 (1863) p. 88. A tall graceful hardy shrub with somewhat quadrate branches and showy yellow flowers, a native of America, but almost run wild in some places in the Konkan and N. Kanara. It is especially useful as a screen. Bureau, Monogr. Bign. t. 13. *Tecoma stans*, Juss. Gen. (1789) p. 139; Dalz. & Gibs. Suppl. p. 55; Talb. Trees, Bomb. ed. 2, p. 256; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354 & Gard. in Ind. ed. 5, p. 411. *Bignonia stans*, Linn. Sp. Pl. ed. 2 (1763) p. 871.

Spathodea campanulata, Beauv. Fl. D'Owar. v. 1 (1805) p. 47, tt. 27–28. A small tree a native of Tropical Africa, with orange-scarlet bell-shaped flowers, 3 by 2½ in., which appear in November. The climate of Bombay seems to suit it and it may be seen in full flower in November

in the Victoria Gardens in the Presidency town. Woodr. Gard. in Ind. ed. 5, p. 413.

Dolichandrone stipulata, Benth. & Hook. f. Gen. Pl. v. 2 (1876) p. 1046. A tree 30–40 ft. high. Leaves 1–1½ in. long; leaflets 3–5 pairs and an odd one. Corolla yellowish-brown outside, purple inside, 2–3 in. long. Capsules woolly-tomentose. A native of Rangoon and Pegu, raised in the old Botanic Gardens at Hewra and Dapuri from Calcutta seed. Fl. B. I. v. 4, p. 379; Watt, Dict. Econ. Prod. v. 3, p. 174. *Bignonia stipulata*, Roxb. Hort. Beng. p. 47; Dalz. & Gibs. Suppl. p. 56.

Heterophragma adenophyllum, Seem. ex Benth. & Hook. f. Gen. Pl. v. 2 (1876) p. 1046. A deciduous tree 30–50 ft. high with large leaves, a brownish-yellow densely tomentose corolla, and variously contorted and twisted capsules, a native of Birma and the Andamans, is more or less cultivated in gardens. The wood is said to be excellent for cabinet-work. Fl. B. I. v. 4, p. 381; Watt, Dict. Econ. Prod. v. 4, p. 226. *Bignonia adenophylla*, Wall.; Dalz. & Gibs. Suppl. p. 56. Mr. H. M. Birdwood [Cat. Fl. Matheran & Mahableshwar (1897) p. 24] mentions having found a tree near the Chauki at Matheran which was no doubt planted.

Colea mauritiana, Boj. Hort. Maurit. (1837) p. 220. A shrub 10–15 ft. high, a native of Madagascar. Leaflets 2 pairs and an odd one, Flowers springing from the stem, remote from the leaves. Corolla red veined with yellow, quite yellow within. *Bignonia Colei*, Boj. in Bot. Mag. (1828) t. 2817; Dalz. & Gibs. Suppl. p. 56.

Crescentia Cujete, Linn. Sp. Pl. (1753) p. 626. The *Calabash-tree*, a native of Tropical America, is, in the gardens in the Presidency, a small tree of irregular growth bearing flowers which are in color a mixture of green, purple, red, and yellow, produced on the stem and older branches and followed by a fruit somewhat resembling a pumalo varying from 2 to 12 in. in diam. with a hard rind. The fruit is used in S. America to boil water in. Jacq. Hist. Select. Stirp. Amer. (1763) p. 175, t. 111; Dalz. & Gibs. Suppl. p. 57; Woodr. Gard. in Ind. ed. 5, p. 412.

Kigelia pinnata, DC. Prodr. v. 9 (1845) p. 247. A handsome small tree, a native of Tropical Africa, with pinnate leaves and long pendulous racemes of dull liver-colored flowers which appear in the hot season. It grows rapidly if planted on the margin of a tank in rich soil, and is propagated by seed. Woodr. Gard. in Ind. ed. 5, p. 412.

Parmentiera cereifera, Seem. Bot. Voy. Herald (1852–57) p. 182, t. 32. An unarmed tree a native of Panama. There used to be a tree in the compound of the Western India Club at Poona. Its curious yellow waxy-looking candle-shaped fruit has obtained for it the name "*Candle-tree of Panama.*" Seemann (*l. c.*) in a description of a forest of these trees in the valley of the river Chagres said that a person entering it might almost fancy himself transported into a chandler's shop. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354.

Order XCV. PEDALIACEÆ.

Herbs, rarely undershrubs. Leaves opposite or the upper alternate, entire, toothed, incised or pedatifid; stipules 0. Flowers irregular, hermaphrodite, solitary (rarely fascicled or racemose), usually axillary. Calyx gamosepalous, usually deeply 4–5-lobed. Corolla tubular-ventricose; limb 5-lobed, obscurely 2-lipped; lobes imbricate. Stamens 4, didynamous (rarely 2). Disk hypogynous, fleshy. Ovary 2 (rarely 1) -celled; ovules many or few, superposed; style filiform; stigma shortly 2-lobed. Fruit hard, indehiscent, or a 2 (rarely 3–4) -valved capsule. Seeds in the Indian species wingless; albumen 0.—Distrib. Genera 12; species about 55, in the warmer regions of both hemispheres, abundant in Africa.

Fruit spinous, indehiscent; seeds 2–1 in each cell ..... 1. Pedalium.
Fruit capsular, 2–4-valved, spineless; seeds many in each cell ..... 2. Sesamum.

1. PEDALIUM, Linn.

A glabrous annual. Leaves opposite or alternate, petiolate, rather broad, inciso-dentate. Flowers axillary, solitary, yellow, suberect, shortly pedicellate; pedicels 2-glandular at the base. Calyx small, 5-partite. Corolla-tube slender below, enlarged above; limb sub-bilabiate; lobes 5, round, spreading, subequal. Stamens 4, didynamous, included; anther-cells ovate, parallel, distinct, pendulous. Ovary 2-celled; ovules 2 in each cell. Fruit hard, indehiscent, 2-celled; upper portion pyramidal-ovoid, obtuse, obscurely 4-gonous, each angle armed with a conical horizontal sharp spine. Seeds 2–1 in each cell, pendulous, oblong.—Distrib. India, Ceylon, Tropical Africa; species 1.

1. **Pedalium Murex,** *Linn. Syst. Nat.* ed. 10 (1759) p. 1123. A much-branched herb 6–15 in. high; stems and branches often slightly rough with scaly glands. Leaves opposite, pale glaucous-green, somewhat fleshy, 1–2 by $\frac{3}{4}$–$1\frac{1}{2}$ in., broadly ovate-oblong, truncate or obtuse, coarsely crenate-serrate or sublobate, glabrous above, the lower side usually covered with minute scales, base acute; petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long. Flowers axillary, solitary; pedicels $\frac{1}{6}$ in. long. Calyx small, scarcely $\frac{1}{8}$ in. long, minutely scaly outside, divided rather more than $\frac{1}{2}$-way down; lobes 5, linear-triangular, acute. Corolla 1 in. long, about $\frac{3}{4}$ in. across at the mouth, bright-yellow; tube $\frac{3}{4}$ in. long, slender; lobes broad, rounded. Filaments glandular-hairy at the base. Fruit $\frac{1}{2}$–$\frac{3}{4}$ in. long, narrowed at the base, pyramidal-ovoid above the spines, bluntly 4-angled, with stout sharp conical horizontal spines from the angles. Fl. B. I. v. 4, p. 386; Grah. Cat. p. 127; Dalz. & Gibs. p. 162; Wight, Icon. t. 1615; Trim. Fl. Ceyl. v. 3, p. 285; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354; Watt, Dict. Econ. Prod. v. 6, part 1, p. 123.—Flowers: Oct. Vern. *Málvi-gokhra*; *Mothe-gokhru.*

Common on the sandy shores of Kathiawar and Gujarat. Konkan: Shrivardhan near Jinjira (Kolaba districts), *Woodrow*; in compounds near the Marine lines Bombay, *Graham.* S. M. Country: Badami, *Bhiva!*, *Woodrow!* Gujarat: Porbandar (Kathiawar), *Cooke!*—Distrib. As the genus.

The herb is medicinally much valued by the natives. Agitated with water the fresh leaves have the property of rendering the water mucilaginous without altering the

taste, color, or odor of the liquid. The mucilaginous liquid is taken as a remedy for gonorrhœa and dysuria and is said to dissolve calculi. See Watt, Dict. Econ. Prod. I. c.

2. SESAMUM, Linn.

Erect or prostrate herbs. Leaves opposite below, alternate above, entire, toothed, lobed or divided. Flowers axillary, solitary or few and fascicled, shortly pedicellate. Calyx small, 5-partite. Corolla 2-lipped; tube ventricose; lobes rounded, those of the upper lip usually rather smaller than the others. Stamens 4, didynamous, included; anthers sagittate, the cells subparallel, distinct. Ovary 2-celled, the cells each soon divided into 2 chambers by the intrusion of a false dissepiment from between the placentas; ovules numerous, 1-seriate in each chamber; style filiform; stigma 2-lobed. Capsule oblong or ovoid, usually 4-angled and 4-grooved, loculicidally 2-valved, 4-chambered. Seeds many, obliquely oblong, somewhat compressed, foveolate.—DISTRIB. India, Tropical and S. Africa; species 10.

1. **Sesamum laciniatum,** *Klein, ex Willd. Sp. Pl.* v. 3 (1800) p. 359. A prostrate herb 1–3 ft.; stems and branches grooved, sparsely hairy with long soft white hairs. Leaves ½–1½ in. long, nearly as broad as long, orbicular or elliptic in outline, variously lobed and laciniate, sparsely hairy above, hairy on the nerves and clothed beneath with a white somewhat mealy tomentum; petioles 0–⅙ in. long. Flowers solitary, axillary; pedicels ⅛ in. long. Calyx ⅓ in. long, deeply divided, hairy outside; segments linear, ½ in. long, strongly ciliate. Corolla 1–1¼ in. long, tubular-ventricose, minutely pubescent outside, purple, with a yellow palate (*Clarke*). Capsules ⅝ by ⅓ in., scabrous-pilose, 2-valved, oblong, compressed, rounded and strongly mucronate at the apex. Seeds ⅙–⅕ by $\frac{1}{10}$ in., obovoid-oblong, foveolate, glabrous. Fl. B. I. v. 4, p. 387; Wight, Icon. t. 1345; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354.—Flowers: Sept.–Oct.

Rare. S. M. COUNTRY; Badami, *Cooke*!, *Woodrow*!; Gokak, *Ritchie*, 1885!—DISTRIB. India (W. Peninsula).

Sesamum indicum, Linn. Sp. Pl. (1753) p. 634. An annual, largely cultivated throughout India for the oil furnished by its seeds. It is probably a native of Tropical Africa, but its original habitat is not known with certainty. It has been cultivated in India from a very remote period, and is grown in many of the tropical regions of the world. The plant is usually about 2 ft. high; stem erect with long ascending branches from the base. Upper leaves lanceolate, entire, the lower often cut at the base into 2 or more serrate segments, glabrous above, puberulous beneath. Flowers pinkish-purple, ill-smelling; corolla pubescent outside. Capsules ¾–1 in. long, bluntly quadrangular, shortly beaked, pubescent; valves separating ½-way down, gaping. Seeds oblong, slightly compressed, glabrous, black or white. The seed is known in commerce as *Gingelly* or *Sesamé* and is exported largely from India, the exports in 1883–84 reaching upwards of 140,000 tons, of which more than 100,000 tons were consigned to France. The plant is known in the Bombay Presidency by the native name of *Til*, and the seeds are of two kinds, the black (*Kála-til*) and the white (*Safed-til*),

the former of which is the more common and yields a superior oil. For a full description, consult Watt, Dict. Econ. Prod. v. 6, part 2, pp. 502–541; Fl. B. I. v. 4, p. 387; Dalz. & Gibs. p. 161; Trim. Fl. Ceyl. v. 3, p. 285; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354. *Sesamum orientale*, Linn. Sp. Pl. (1753) p. 634; Grah. Cat. p. 126.—Flowers: Aug.–Sept.

The following, which do not belong to any of the foregoing genera, are grown as ornamental plants:—

Martynia diandra, Glox. Obs. Bot. (1785) p. 14, t. 1. A native of Mexico, becoming naturalized and springing up on rubbish-heaps and in waste places. Leaves large, opposite, cordate, sinuately lobed and minutely dentate, often covered with a glutinous dew-like substance. Flowers diandrous, handsome, ill-smelling, rose-colored, in racemes. The curious beetle-shaped hard and woody fruit with 2 sharp anterior hooks is often an object of curiosity. Grah. Cat. p. 127; Dalz. & Gibs. Suppl. p. 58; Woodr. Gard. in Ind. ed. 5, p. 413.—VERN. *Vichu-acha-jhar*.

Ceratotheca triloba, E. Mey. ex Bernh. in Linnæa, v. 16 (1842) p. 29. A showy annual from Natal, attaining 3 ft. in height, introduced into the Bombay Presidency in 1888. The flowers are of varying tints of purple or lilac. The capsules are 2-horned. The plant grows readily in the Deccan without any special care and may be seen in the Empress Garden at Poona. Woodr. Gard. in Ind. ed. 5, p. 414.

ORDER XCVI. ACANTHACEÆ.

Herbs or shrubs, rarely trees. Leaves opposite, usually entire stipules 0. Flowers hermaphrodite, usually irregular, in cymes, racemes, or spikes (rarely solitary); bracts large or small, sometimes 0; bracteoles usually 2, sometimes more under the individual flowers, free or connate into an epicalyx. Calyx 5 (rarely 4)-partite (in *Thunbergia* small, often multifid). Corolla 2-lipped or subequally 5-lobed; lobes imbricate or twisted in bud. Stamens 4 or 2, inserted on the corolla-tube; anthers 2- or 1-celled, the cells sometimes remote. Disk often conspicuous. Ovary superior, 2-celled; ovules 1 or more in each cell, 1- or 2-seriate, anatropous; style simple, filiform, or thickened below; stigma usually 2-lobed, the lobes sometimes unequal. Fruit a loculicidal capsule, the valves often elastically recurved, the septum splitting, the seeds borne on each half. Seeds usually hard, attached (except in a few genera) to recurved subacute supports (*retinacula*), ovoid or compressed, smooth or rugose, rarely hispid; albumen 0 or (rarely) scanty.—DISTRIB. Tropical and warm temperate regions; genera 140; species about 2000.

Climbers; seeds not supported on hard retinacula.
  Calyx minute, annular or 10–15-toothed; pollen globose, obscurely banded, smooth or very minutely tuberculate... 1. THUNBERGIA.
  Calyx 5-lobed (often obscurely); pollen cog-wheel-shaped... 2. MEYENIA.
Erect or prostrate (not climbing) herbs or shrubs.
  Seeds not supported on hard retinacula.

Ovules many in each cell.
Ovules superposed in 2 rows in each cell; corolla-lobes imbricate; leaves not pinnately divided.
Calyx 4-partite; stamens 2.
Bracts rigid; peduncle of spike covered with alternate scales ..... 3. TUBIFLORA.
Bracts herbaceous; spikes sessile or, if pedunculate, the peduncle without scales ..... 4. NELSONIA.
Calyx 5-partite; stamens 4 ..... 5. STAUROGYNE.
Ovules not in 2 rows in each cell; corolla-lobes contorted, twisted to the left in bud; lower leaves pinnately divided ..... 6. CARDANTHERA.
Seeds supported on hard upward-curved retinacula.
Corolla without an upper lip; lower lip large, expanded, 3-lobed; ovules 2 in each cell.
Lower filaments with an excurrent process ..... 7. BLEPHARIS.
Lower filaments without an excurrent process ..... 8. ACANTHUS.
Corolla 2-lipped or with 5 subequal lobes.
Corolla-lobes twisted to the left in bud.
Ovules more than 2 in each cell; capsule normally with 6 or more seeds.
Corolla distinctly 2-lipped.
Inflorescence spinous ..... 9. ASTHERACANTHA.
Inflorescence not spinous ..... 10. HYGROPHILA.
Corolla subequally 5-lobed.
Bracteoles large, usually exceeding the calyx; capsule with a solid base ..... 11. RUELLIA.
Bracteoles small, narrow; capsule seed-bearing throughout ..... 12. HEMIGRAPHIS.
Ovules 2 in each cell; capsule with 4 or fewer seeds.
Placentas separating elastically from the base of the ripe capsule; stamens 4.
Bracteoles very large, reticulately nerved . 13. PETALIDIUM.
Bracteoles 0 ..... 14. MICRANTHUS.
Placentas not separating elastically from the base of the ripe capsule.
Anthers minutely mucronate or spurred at the base; stamens 4 ..... 15. DYSCHORISTE.
Anthers not spurred at the base.
Corolla subequally 5-lobed.
Corolla-tube long, linear, slender; stamens 2 ..... 16. DÆDALACANTHUS.
Corolla-tube narrow below, usually infundibuliform upwards; stamens 4 (except in *S. reticulatus*). 17. STROBILANTHES.
Corolla deeply 2-lipped; stamens 4 ... 18. CALACANTHUS.
Corolla-lobes imbricate in bud.
Ovules 3–10 in each cell; capsule normally 6- or more-seeded.
Capsule compressed at right angles to the septum; seeds ovoid, hardly compressed.
Flowers in panicled often unilateral racemes, without axillary cladodes ..... 19. ANDROGRAPHIS.
Flowers clustered in the midst of axillary cladodes ..... 20. HAPLANTHUS.
Capsule subterete; seeds much compressed ... 21. GYMNOSTACHYUM.
Ovules 2 or rarely 1 in each cell.
Corolla-lobes 5, subequal.
Anthers 1-celled.
Stamens 4, didynamous; calyx 5-partite, the 2 inner sepals smaller than the outer ..... 22. CROSSANDRA.

Anthers 2-celled.
Calyx 4-partite, the 2 opposite outer sepals much larger than the inner; stamens 2 only perfect ..... 23. BARLERIA.
Calyx 2-lipped, 5-lobed; stamens 4 ... 24. NEURACANTHUS.
Calyx-segments 5, subequal, small.
Stamens 4; corolla-tube inflated above ..... 25. ASYSTASIA.
Stamens 2; corolla-tube long, slender ..... 26. ERANTHEMUM.
Corolla distinctly 2-lipped.
Stamens 4; anthers 2-celled ..... 27. LEPIDAGATHIS.
Stamens 2.
Anthers 1-celled; bracts larger than the calyx-segments ..... 28. HYPOESTES.
Anthers 2-celled.
Placentas separating elastically from the valves from the base upwards.
Bracts in unilateral spikes ..... 29. RUNGIA.
Bracts clustered in the leaf-axils or laxly cymose ..... 30. DICLIPTERA.
Placentas not separating elastically from the valves.
Anther-cells parallel, subequal; bracts large, imbricate..... 31. ECBOLIUM.
Anther-cells one higher up than the other.
Anther-cells (at least the lower) with a white basal spur-like appendage.
Capsule usually 4-seeded; seeds rough or tuberculate ..... 32. JUSTICIA.
Capsule 2-seeded; seeds smooth, usually shining ..... 33. MONECHMA.
Anther-cells not spurred at the base.
Anther-cells apiculate ... 34. ADHATODA.
Anther-cells muticous.
Bracts and bracteoles small, subequal; corolla white ..... 35. RHINACANTHUS.
Bracts larger than the bracteoles, in opposite valvate pairs; corolla rose or purple ..... 36. PERISTROPHE.

1. **THUNBERGIA,** Linn. f.

Climbers. Leaves opposite, often cordate, hastate or angular. Flowers axillary, solitary, or in pairs, or racemose; bracts at the base of the pedicels leaf-like; bracteoles large, the margins cohering at least when young. Calyx small, annular; teeth 10–16 or obscure. Corolla conspicuous; tube swollen, curved; limb oblique with rounded lobes twisted to the left in bud. Stamens 4, didynamous, inserted near the base of the corolla-tube; anthers 2-celled, the cells parallel, oblique, spurred or not at the base; pollen globose, obscurely banded, smooth or most

minutely tubercled. Disk annular or cushion-shaped. Ovary 2-celled; ovules 2 in each cell, collateral; style long; stigma funnel-like, 2-lobed or entire, or style 2-fid with capitate stigmas. Fruit a capsule, globose below, suddenly narrowed into a barren sword-shaped beak. Seeds 2 in each cell, ovoid or dorsally compressed, glabrous, base plane or excavated; funicle minute or conic.—DISTRIB. S.E. Asia, Tropical and S. Africa, Mascarene Islands; species 96.

Flowers white, solitary or 2 together; calyx deeply 12–15-toothed	1. *T. fragrans.*
Flowers yellow in long pendent racemes; calyx with obscurely crenulate margin	2. *T. mysorensis.*

1. **Thunbergia fragrans,** *Roxb. Cor. Pl.* v. 1 (1795) p. 47, t. 67. A twining perennial; stems long, slender, dilated at the nodes, sparsely retrorsely hairy or glabrous. Leaves 2–3½ by ¾–1½ in., deltoid-ovate, acute or obtuse, apiculate, entire, or sometimes with a few large angular apiculate lobes at the base, base rounded, cordate or hastate; petioles ¼–1¼ in. long. Flowers axillary, solitary, or 2 together; pedicels 1–2 in. long; bracteoles ¾ by ⅓ in., oblong-lanceolate, acute. Calyx ⅛–⅙ in. long, deeply divided, pubescent; teeth 12–15, linear-lanceolate, acute. Corolla 1½ in. long, pure white, not fragrant, pubescent outside; tube ¾–1 in. long, slightly contracted below the limb; limb with 5 obovate truncate, coarsely toothed, spreading lobes. Capsules glabrous, 1 in. long or more (including the beak), the basal part globose, the beak ¾ in. long, empty, dagger-shaped. Seeds 4 or (by suppression) fewer, ⅛ in. in diam., hemispheric, excavated on the plane face, reticulato-rugose. Fl. B. I. v. 4, p. 390; Grah. Cat. p. 163; Dalz. & Gibs. p. 183; Trim. Fl. Ceyl. v. 3, p. 288; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354.—Flowers: Oct.–Nov. VERN. *Chimine.*

KONKAN: *Dalzell & Gibson*; Kanheri jungles, *Graham*; Panchgani, abundant, *Cooke*!, *Woodrow*!, *H. M. Birdwood.*—DISTRIB. Throughout India in elevated districts; Ceylon, Malaya, Philippines, N. Australia.

The specific name is a misnomer if applied to indicate fragrant flowers. In fact, Roxburgh himself (Cor. Pl. l. c.) says "The plant possesses an agreeable fragrance, and the beauty of its flowers, though not fragrant, entitles it to a place in the flower-garden." I am well acquainted with the plant, which grows in profusion about Panchgani, but have never detected any fragrance therefrom. J. Graham (Cat. Bo. Pl.), Dalzell & Gibson (Bo. Fl.), Trimen (Fl. Ceyl.), T. Anderson (Thw. Enum. p. 224), all agree that the flowers are *not* fragrant, while Ridley [Trans. Linn. Soc. ser. 2, v. 3 (1893) p. 332] remarks that the plant is no more fragrant in the Malay Peninsula than in Ceylon.

2. **Thunbergia mysorensis,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 448. An extensive glabrous climber with long slender branches. Leaves opposite, 3–5 by 1–1½ in., elliptic-lanceolate, acuminate, glabrous, entire, subcrenate or toothed, base rounded, acute or subcordate; nerves 3 from the base with reticulate venation between them; petioles ½–1 in. long. Flowers in long lax pendent racemes; bracts beneath the pedicels ⅙–½ in. long, linear-lanceolate, very acute; bracteoles 2 beneath the calyx, 1 in. long, ovate-oblong, acuminate, parallel-nerved, with reticulate venation between the nerves, purplish-green, closed in bud, afterwards opening at first down one side. Calyx about ⅓ in. long, salver-shaped, with an obscurely crenulate margin, glabrous. Corolla 2-lipped,

reaching 2 in. long and as broad across the mouth; tube purplish; limb bright-yellow or orange, or maroon-colored. Filaments with a tuft of hairs at the very base; anthers bearded and with a slender subulate spur $\frac{1}{4}$–$\frac{1}{3}$ in. long at the base of each cell. Ovary sunk in a deep fleshy disk; stigma funnel-shaped. Capsules not seen. Fl. B. I. v. 4, p. 393; Talb. Trees, Bomb. ed. 2, p. 260; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Hexacentris mysorensis*, Wight, Icon. t. 871; Bot. Mag. (1854) t. 4786; Dalz. & Gibs. p. 183.—Flowers: Dec.–Jan.

KANARA: in the evergreen forests of N. Kanara near the falls of Gairsoppa, *Talbot*. Dalzell (Bo. Fl. p. 183) did not believe that the plant extended far enough from Mysore to reach the Bombay Presidency, although found within the latitude of Dharwar. It is planted in Poona and Mahableshwar.—DISTRIB. Nilghiri hills and Mysore.

Thunbergia grandiflora, Roxb. Hort. Beng. (1814) p. 45. A large climber a native of Eastern Bengal, with large cordate ovate or sometimes angular leaves and racemes of bluish flowers. The plant is propagated by suckers and is of easy culture. Two varieties are cultivated, one with smooth leaves which flowers when of small size, and another with rough hairy leaves of more vigorous growth. Fl. B. I. v. 4, p. 392; Grah. Cat. p. 163; Dalz. & Gibs. Suppl. p. 70; Wight, Icon. t. 872; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355 & Gard. in Ind. ed. 5, p. 416.

Thunbergia alata, Boj. ex Sims, Bot. Mag. t. 2591. A twiner very similar in general appearance to *Thunbergia fragrans*, a native of Tropical Africa, but commonly grown in gardens and becoming naturalized. It has orange-yellow, pale-yellow, or sometimes milk-white flowers; the throat of the corolla is hairy and purple-black or deep claret-colored inside. From the dark-colored eye at the base of the corolla-limb the plant is often called "*Black-eyed Susan*" by Anglo-Indians. Fl. B. I. v. 4, p. 391; Dalz. & Gibs. Suppl. p. 71; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354 & Gard. in Ind. ed. 5, p. 417.

Thunbergia erecta, T. Anders. in Journ. Linn. Soc. v. 7 (1864) p. 18. A hardy shrub about 6 ft. high, thriving in bright sunshine, a native of Tropical Africa. It has ovate, acuminate leaves with usually a blunt tooth on each margin towards the upper part. Calyx-teeth 5–9, linear. Corolla purple or white, with a tube $1\frac{1}{2}$ in. long. *Meyenia erecta*, Benth. in Hook. Niger Flor. (1849) p. 476; Woodr. Gard. in Ind. ed. 5, p. 415.

2. **MEYENIA,** Nees.

A climber. Leaves opposite. Flowers axillary, large, usually solitary, pedicellate; bracteoles large, leaf-like, ovate-oblong. Calyx small, 5-lobed (sometimes obscurely so). Corolla infundibuliform, the throat gradually enlarged, often closed with a ring of hairs. Stamens 4, didynamous; anthers bearded at the apex, the anther-cells of the longer pair of stamens unequal, more or less divaricate, one cell almost abortive, long and narrow, glabrous, the other cell hirsute and spurred at the base; anther-cells of the shorter pair of filaments subequal, not spurred

at the base; pollen cog-wheel-shaped (*Kamnradpollen*, Lindau, in Engl. & Prantl, Pflanzenf.). Ovary 2-celled; stigma 2-lobed. Capsule swollen at the base, conical, attenuated upwards, 2-celled and 4-seeded at the base; dissepiment persistent, adnate to the valves.—DISTRIB. East Indies; species 1.

1. **Meyenia Hawtayneana,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 78. Scandent, smooth, glaucous; stem slender, angular. Leaves opposite, sessile, coriaceous, 2–3 by 1–1½ in., ovate, acute, entire, glabrous, smooth and shining above, pale beneath, reticulately veined, base cordate. Flowers in opposite axils; pedicels ¼–1¼ in. long, with a tuft of dirty-white hairs at the base; bracteoles 1–1⅜ in. long, ovate-oblong, reticulately veined, apiculate. Calyx about $\frac{1}{20}$ in. long, glabrous; lobes obscure. Corolla bluish-purple, yellow within the tube, 1½–1¾ in. long, glabrous; lobes rounded, subequal. Stamens 4, didynamous; filaments hairy at the base and in the upper part below the anthers; anthers bearded at the apex, the anther-cells of the longer pair of stamens unequal, one cell almost abortive, narrow, ⅕ in. long, glabrous, the other cell shorter, broader, hirsute, spurred at base; anther-cells of the shorter pair of filaments subequal, glabrous except at the apex, not spurred at the base. Stigma ⅛ in. long, deeply 2-lobed, each lobe subfunnel-shaped, again divided. Capsules 1–1¼ in. long, swollen at the base, acutely conical above, glabrous; the valves woody, retrorsely curved. Seeds subhemispheric, excavate at the base. Wight, Icon. t. 1487; DC. Prodr. v. 11, p. 60. *Thunbergia Hawtayneana*, Wall. Tent. Flor. Nap. (1826) p. 49 in Obs.; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 391; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 354.

Rare. S. M. COUNTRY: Dharwar, *Law*!, *Woodrow*. KANARA: *Law*!—DISTRIB. India (W. Peninsula).

3. **TUBIFLORA,** J. F. Gmel. in Linn. Syst. Nat. ed. 13, v. 2 (1791) p. 27.

ELYTRARIA, Michaux, Fl. Bor. Am. v. 1 (1803) p. 8; Benth. & Hook. f. Gen. Pl. v. 2, p. 1073.

Herbs; stems short or almost 0. Leaves alternate, crowded, subradical. Flowers in close rigid simple or divided spikes. Scapes covered by spirally imbricate (not opposite) bracts; bracteoles smaller than the bracts. Calyx 4-partite; segments unequal, the largest sometimes 2-fid. Corolla small, white or bluish, 2-lipped; tube linear; lobes 5, oblong, imbricate in bud. Stamens 2, perfect, inserted in the corolla-throat; anthers elliptic, acute, the cells 2, parallel, with or without a minute spur at the base. Disk small. Ovary 2-celled; ovules 6–10 in each cell, superposed; style short; stigma shortly 2-lobed. Capsule ovoid, acute. Seeds minute, ovoid, reticulate, minutely papillose, not supported on retinacula.—DISTRIB. Species about 3, of which 1 is widely spread in Tropical Africa and Asia.

Though the term *Tubiflora*, a word which is invariably used as an adjective and not a substantive, is objectionable when employed to denote a genus, still the fact remains that this name is 12 years prior to that of *Elytraria*, and its adoption therefore necesary. It has been adopted by Lindau in Engl. & Prantl, Pflanzenf.

1. **Tubiflora acaulis,** *O. Kuntze, Revis. Gen.* v. 1 (1891) p. 500. Stem 0 or scarcely any. Leaves radical, 4–8 by 1¾–3 in., spathulate or oblanceolate, obtuse, more or less crenate, glabrous or nearly so except on the nerves beneath, which are usually more or less hairy, base tapering, running down into a short or long hairy petiole. Scapes several, usually exceeding the leaves, 4–12 in. long, clothed throughout their length with small rigid bracts. Flowers in harsh simple or branched (often 3-branched) spikes ½–4 in. long; bracts ¼ in. long, ovate, acuminate, sometimes spinous-pointed, glabrous outside, pubescent inside and with ciliate margins; bracteoles ⅛ in. long, narrowly linear or linear-lanceolate, penicillate at the apex and with scarious ciliate margins. Calyx ⅕ in. long, divided to the base or nearly so; sepals penicillate at the apex, 3 of them narrowly-lanceolate, the fourth of equal length but twice as broad, sometimes 2-fid at the apex, all with scarious margins. Corolla ¼–⅓ in. long, pale-blue or white; tube scarcely ⅛ in. long. Anthers not spurred at the base. Capsules ⅓ in. long, ovoid, acute; valves recurved. Seeds ovoid. Lindau, in Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 289. *Elytraria crenata*, Vahl, Enum. v. 1 (1805) p. 106; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 394; Dalz. & Gibs. p. 183; Trim. Fl. Ceyl. v. 3, p. 289; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355.—Flowers: Oct. VERN. *Dasmori.*

Not common. GUJARAT: Kundiana (Broach Collectorate), *Dalzell!*; Ankleshwar, 4 miles south of the Narbada river, *Kanitkar!*; Ahmedabad, *Stocks*, 250!—DISTRIB. India (W. Peninsula, extending north to Delhi and the E. Himalaya); Ceylon, Tropical and S. Africa, Tropical and N. America.

4. NELSONIA, R. Br.

A diffuse softly hairy herb. Leaves opposite, subequal. Flowers small, in dense short spikes; bracts herbaceous, closely imbricate, alternate or spiral (not opposite). Calyx small, 4-partite; sepals unequal, lanceolate, the larger often 2-fid. Corolla small, purplish, rose or white; tube slender; limb 2-lipped, the lobes obtuse. Stamens 2, inserted above the middle of the tube, subincluded; anthers 2-celled, the cells elliptic, somewhat divergent, distinct, muticous or minutely spurred. Ovary 2-celled; ovules 8–10 in each cell, arranged vertically in 2 rows on the double placental line; style slender; stigma shortly 2-lobed. Capsule ovoid-conic with 8–16 seeds in the basal half, barren above. Seeds ellipsoid or subglobose, granular, not supported on retinacula.—DISTRIB. S.E. Asia, Africa, America, Australia; species 1.

1. **Nelsonia campestris,** *R. Br. Prodr.* (1810) p. 481. A diffuse softly villous herb; stems short; branches decumbent, spreading. Leaves opposite, elliptic-oblong, obtuse, entire, the lower large (4–8 in. long) with long petioles (sometimes 2 in. long), the upper leaves shortly petiolate or subsessile, ½–2 in. long, pubescent or canescent. Flowers in ovate or cylindric spikes ½–2 in. long; bracts ⅛–¼ in. long, broadly ovate, subobtuse, herbaceous, silky-pubescent; bracteoles represented by 2 opposite tufts of silky hairs below the calyx. Calyx ⅓ in. long, 4-partite; sepals unequal, lanceolate, very acute, with strong parallel nerves. Corolla ¼ in. long, purplish. Capsules ⅓ in. long, ovoid-conic, glabrous, the valves recurved at the apex. Seeds broadly ellipsoid,

brown, granular. Fl. B. I. v. 4, p. 394; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Nelsonia tomentosa*, Dietr. Sp. Pl. v. 1 (1831) p. 419; Dalz. & Gibs. p. 183. *N. brunelloides*, O. Kuntze, Revis. Gen. Pl. (1891) p. 493; Lindau, in Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 289. *Justicia brunnelloides*, Lam. Tab. Encyc. v. 1 (1791) p. 40.—Flowers: Jan.

KONKAN: *Stocks!*; 23 miles east of Ratnagiri, *Kanitkar!*; Wari jungles, common, *Dalzell & Gibson.* GUJARAT: Panchmahâls, *Nairne.* KANARA: Kâla naddi, *Ritchie*, 1892!—DISTRIB. Throughout India (except in the western desert tracts); S.E. Asia, Australia, Africa, America.

5. **STAUROGYNE,** Wall.

Herbs (rarely undershrubs). Leaves opposite (rarely alternate). Flowers in terminal or pseudo-axillary simple or compound lax or dense racemes or spikes; bracts usually foliaceous; bracteoles 2 beneath the calyx, shorter than the bracts. Calyx divided nearly to the base; segments 5, oblong or linear, subequal or one larger than the others. Corolla 2-lipped; tube long or short, cylindric or slightly infundibuliform; lobes 5, short, spreading. Stamens 4, didynamous, usually included; filaments usually hairy; anthers with 2 ovoid separate muticous cells. Disk inconspicuous. Ovary 2-celled; ovules numerous; style linear; stigma of 2 narrow lobes, the lower lobe sometimes again 2-lobed. Capsule small, oblong, seed-bearing throughout. Seeds 15-30 in each cell, small, globose or cuboid, glandular when immature, ultimately nearly smooth or with obscure shallow pits; retinacula 0.—DISTRIB. S.E. Asia, Malaya, Australia, Brazil; species about 40.

Stem 12–15 in. high, viscous-pubescent; branches not trailing ... 1. *S. glauca.*
Stem short, not viscous-pubescent; branches trailing ..... 2. *S. zeylanica.*

1. **Staurogyne glauca,** *O. Kuntze, Revis. Gen.* v. 1 (1891) p. 497. Stem erect, 12–15 in. high, viscous-pubescent upwards. Leaves 1½–2 by ½–⅝ in., the lower opposite, the upper alternate, or sometimes nearly all alternate, spathulate, obtuse, slightly viscous-pubescent or glabrous, base attenuated, running down into the petiole; petioles ¼–½ in. long. Spikes 2–6 in. long; bracts at the base of the spike similar to the stem-leaves, gradually becoming smaller upwards; bracteoles 2, beneath the calyx, ¼ in. long, linear-oblong or slightly spathulate, obtuse, pubescent, with a strong mid-nerve. Calyx divided to the base or nearly so; sepals glandular-hairy, the larger ⅓ in. long, linear-oblong, subobtuse, much broader than the other 4, which are ¼ in. long and linear-subulate. Corolla ½–⅔ in. long, straight; tube cylindric; lobes 5, rounded, $\frac{1}{20}$ in. long. Filaments pubescent; anther-cells muticous or very slightly apiculate at the base. Stigma of 2 unequal acute lobes, the lower one reflexed, sometimes 2-fid. Capsules membranous, ⅛ in. long, oblong, obtuse, shortly apiculate, glabrous, bearing seeds from the base nearly to the apex. Seeds minute, globose. *Ebermaiera glauca*, Nees, in DC. Prodr. v. 11 (1847) p. 73; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 395; Dalz. & Gibs. p. 184; Wight, Icon. t. 1488; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355.

Not common. KONKAN: *Stocks!* S. Konkan, *Dalzell & Gibson.*—DISTRIB. India (W. Peninsula, Bengal, Tenasserim).

2. **Staurogyne zeylanica,** *O. Kuntze, Revis. Gen.* v. 1 (1891) p. 497. Stem short, erect, usually with long procumbent trailing pubescent branches. Leaves often red beneath (*Dalzell & Gibson*), those of the main stem 1½–3 by ¾–1⅛ in., with long petioles, those of the branches ½–1½ by ⅓–⅝ in., with short petioles or subsessile, elliptic or slightly obovate, subobtuse, more or less pubescent, pale beneath, base of the stem-leaves much attenuated into the petiole. Flowers in dense spikes 1–2 in. long; bracts foliaceous, hairy and ciliate, ⅜ by ⅛ in., obovate, apiculate, with strong mid- and marginal-nerves; bracteoles ⅓ in. long, linear-oblong, bristly. Calyx densely bristly, divided to the base or nearly so, the large sepal ⅓ by $\frac{1}{16}$ in., linear-oblong, subobtuse with a strong mid-nerve, the other 4 sepals slightly shorter and much narrower, linear-subulate. Corolla ⅜ in. long; lobes about $\frac{1}{12}$ in. long, oblong, rounded. Filaments hairy. Stigma of 2 unequal acute lobes, the lower lobe sometimes 2-fid. Capsules ½ in. long, narrowly oblong, obtuse, apiculate. Seeds subglobose or ellipsoid, distantly pitted. *Ebermaiera zeylanica*, Nees, in DC. Prodr. v. 11 (1847) p. 74; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 397; Trim. Fl. Ceyl. v. 3, p. 290; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Erythracanthus elongatus*, Dalz. & Gibs. p. 184 (*not* of Nees).

Not common. KONKAN: *Stocks!*, *Dalzell!*; Wari jungles, *Dalzell & Gibson*. KANARA: Supa on the Kála naddi, *Ritchie*, 1212!—DISTRIB. India (W. Peninsula); Ceylon.

6. **CARDANTHERA,** Buch.-Ham. ex Voigt, Hort. Suburb. Calc. (1845) p. 482.

Aromatic often viscid herbs. Leaves opposite, the upper toothed (rarely entire), the lower often pinnatifid or, if submerged, pectinate. Flowers in spikes or whorls or 1–3 together in opposite axils; bracts or bracteoles often suppressed. Calyx divided almost to the base; sepals 5, narrow, often unequal. Corolla 2-lipped; tube nearly straight, shorter than the calyx; limb long, the lobes twisted to the left; throat with a transversely plaited palate. Stamens 4, didynamous; anthers of the upper pair often smaller, the cells parallel. Ovary narrow, 2-celled; ovules many. Capsule sessile, narrow, seed-bearing throughout. Seeds 40–100, small, ovoid, somewhat compressed, glandular-puberulous or glabrous; retinacula minute, conical, soft, straight.—DISTRIB. Species 10, of which 2 are African, the others Indian.

Lindau (Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 295) has adopted for this genus the name *Synnema*, under, it would appear, the erroneous impression that it was the older name. The genus *Synnema* is due to Bentham (DC. Prodr. v. 10 (1846) p. 538). *Cardanthera* appears in DC. Prodr. (v. 11 (1847) p. 67), and were this its first publication it would have been subsequent to *Synnema*. It had, however, been previously (1845) published by Voigt (l. c.) as due to Buchanan.

1. **Cardanthera pinnatifida,** *Benth. in Gen. Pl.* v. 2 (1876) pp. 1074–75, ex *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4, p. 405. A slender glandular-pubescent herb 1–2 ft. high; stem obtusely 4-gonous, glandular-pubescent, swollen at the nodes. Leaves 2–4 by ½–1 in., oblong-lanceolate, subobtuse, glandular-pubescent, deeply pinnatifid; lobes numerous, oblique, linear-oblong, obtuse, entire or serrulate. Flowers usually solitary in opposite axils (sometimes in lax spikes); bracts

$\frac{1}{4}$–$\frac{1}{3}$ in. long, elliptic-oblong, glandular-pubescent, often with a serrate tooth near the apex; bracteoles $\frac{1}{5}$ in. long, oblong, obtuse, glandular-hairy, sometimes suppressed. Calyx rather more than $\frac{1}{4}$ in. long, divided to the base or nearly so; sepals narrow ($\frac{1}{50}$–$\frac{1}{40}$ in. wide), linear-subspathulate, sometimes with small scattered teeth on the margin, ciliate. Corolla purple, $\frac{1}{2}$ in. long, 2-lipped; tube enlarged below the limb; upper lip with 2 oblong obtuse lobes; lower lip equally 3-lobed, bullate. Stamens 4 fertile; filaments glabrous; anther-cells parallel, equal, muticous at the base. Capsules $\frac{1}{4}$ in. long, narrowly oblong, pointed, glabrous. Seeds small, supported on minute conical (not curved) soft retinacula. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Nomaphila pinnatifida*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 38; Dalz. & Gibs. p. 184; Hook. Icon. t. 843. *Adenosma pinnatifida*, T. Anders. in Journ. Linn. Soc. v. 9, p. 455; Bedd. Icon. Pl. Ind. Or. t. 246.—Flowers: Jan.–Mar.

KONKAN: river-banks of the S. Konkan, *Dalzell & Gibson*; near running streams at the foot of the Ghâts, *Dalzell*! DECCAN: *Stocks*! S. M. COUNTRY: Mulas, *Ritchie*, 1932! KANARA: Deviman Ghât (N. Kanara), *Woodrow*!—DISTRIB. India (W. Peninsula).

7. BLEPHARIS, Juss.

Undershrubs often spinous or with spinous-toothed leaves. Leaves opposite or 4-nately whorled. Flowers in terminal spikes or on suppressed late al branches, strobilate, tetrastichous or capitate and few-flowered, or axillary and 1-flowered, bracteolate. Calyx 4-partite nearly to the base; segments unequal, in opposite pairs, one of the larger pair emarginate or 2-lobed, the 2 inner segments much shorter and narrower. Corolla 2-lipped; tube rigid; upper lip subobsolete; lower lip spreading, nearly flat, obovate or oblong, with 3–5 rounded lobes, purple, blue or white. Stamens 4, didynamous; filaments thick, rigid, those of the lower stamens produced beyond the attachment of the anthers; anthers with 1 large cell with densely bearded margins, the other cell small or obsolete. Disk annular. Ovary 2-celled, ovules 2 in each cell; style linear; stigma shortly 2-fid. Capsule oblong, scarcely contracted at the base, 2–4-seeded. Seeds compressed, orbicular, echinate, supported on rigid retinacula.—DISTRIB. Mostly African; a few species in India; species 50.

Leaves in opposite pairs	1. *B. asperrima.*
Leaves 4 in a whorl.	
Herbs; flowers solitary or 2-3 together.	
Leaves petiolate, thin, acute	2. *B. boerhaviæfolia.*
Leaves subsessile, thick and fleshy, obtuse	3. *B. molluginifolia.*
A small shrub; flowers in strobilate spikes	4. *B. sindica.*

1. **Blepharis asperrima,** *Nees, in DC. Prodr.* v. 11 (1847) p. 267. Stems 8–24 in. long, suberect or prostrate and rooting at the nodes, pale, striate, glabrous or nearly so, usually with a few hairs at the nodes. Leaves opposite, 2–3 by $\frac{3}{4}$–$1\frac{3}{4}$ in., ovate-lanceolate, acute or acuminate, finely apiculate, entire or spinous-dentate, rough on both surfaces with sharp bulbous-based hairs, base tapering; main nerves 4–6 pairs; petioles $\frac{1}{5}$–$\frac{1}{2}$ in. long, hairy. Flowers solitary, sessile in the upper axils, or in terminal short spikes; bracteoles in 3 opposite pairs, the outer $\frac{1}{3}$–$\frac{3}{4}$ by $\frac{1}{4}$ (but somewhat variable in length), ovate-lanceolate, acute, apiculate, hairy, the second pair rather more than $\frac{1}{2}$ in. long, cuneiform,

with 3 lanceolate spinescent teeth at the apex, the middle tooth the shortest, the innermost pair $\frac{3}{4}$ in. long, linear-subspathulate, apiculate, all green in the upper, membranous and white with green veins in the lower part. Calyx divided to the base or nearly so, the two longer segments 1 in. long, oblong-spathulate, one of them acutely 2-lobed, the other subacute at the apex, green in the upper, white with green veins in the lower part, the other 2 segments $\frac{1}{2}$ in. long, lanceolate, acute, white with a green midrib. Corolla 1 in. long, blue with darker veins or white; upper lip 0; lower lip oblong, 3-fid, hairy above and with yellow hairs in the throat; lobes $\frac{1}{8}$ in. long, oblong, rounded. Capsules less than $\frac{1}{2}$ in. long, oblong, apiculate, 2-seeded. Seeds $\frac{1}{8}$ in. long, ovoid, compressed, closely echinate with soft obtuse spines. Fl. B. I. v. 4, p. 478; Dalz. & Gibs. p. 192; Wight, Icon. t. 1534; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Oct.–Dec. VERN. *Dikna*: *Akada*.

Common on the Konkan and Deccan hills. KONKAN: *Stocks*!, *Law*!, *Kanitkar*!; Revadanda, *Woodrow*. DECCAN: Sinhagad, *Bhiva*!; Igatpuri, *Edgeworth*!; Mahableshwar, *Cooke*! KANARA: Kála naddi, *Ritchie*, 597!—DISTRIB. India (W. Peninsula), apparently endemic.

2. **Blepharis boerhaviæfolia,** *Pers. Syn.* v. 2 (1807) p. 180. Stems prostrate, 6–20 in. long, wiry, rooting at the nodes, much divaricately branched, pubescent. Leaves in a whorl of 4, unequal, 1–2¼ by ½–1¼ in., thinly membranous, elliptic or slightly obovate, acute, finely apiculate, entire or with a few coarse distant serratures on the margin, ciliate, appressedly pubescent above, paler and glabrous (except on the nerves) beneath; petioles ½ in. long. Flowers axillary, solitary or 2 or 3 together; bracteoles 8 in opposite pairs becoming larger upwards, the outermost pair $\frac{1}{8}$ in. long, the second pair $\frac{1}{5}$ in., the third pair $\frac{1}{4}$–$\frac{1}{3}$ in. long, all 3 pairs cuneiform below, broadly spathulate and rounded above, strongly 3-nerved, furnished on the upper margin with stiff acute, retrorsely hairy bristles $\frac{1}{10}$–$\frac{1}{8}$ in. long, the fourth (innermost) pair of bracts unlike the others, rather more than $\frac{1}{4}$ in. long, linear with a flat rounded apex, strongly 3-nerved, and furnished on the apical margin with retrorsely hairy acute bristles as the 3 outer pairs, all 4 pairs of bracteoles white with green veins. Calyx-segments lanceolate, acute; the largest ½ in. long, pubescent and ciliate, 3-nerved from the base; the opposite segment $\frac{3}{8}$ in. long, acutely and shortly 2-toothed, pubescent and ciliate, 2-nerved, one nerve running into each tooth; the 2 lateral segments $\frac{1}{4}$ in. long with a strong midnerve, ciliate. Corolla ½–$\frac{2}{3}$ in. long, pubescent, pale blue with a yellow spot on the lower lip. Capsules $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovoid, usually 2-seeded. Seeds echinate with obtuse spines. Fl. B. I. v. 4, p. 478; Grah. Cat. p. 160; Dalz. & Gibs. p. 192; Wight, Icon. t. 458; Trim. Fl. Ceyl. v. 3, p. 316; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Oct.–Dec.

KONKAN: *Stocks*! S. M. COUNTRY: Belgaum, *Ritchie*, $\frac{589}{2}$! GUJARAT: Ahmedabad, *Cooke*!; Sidpur near Ahmedabad, *Stocks*, 242!; Surat, *Woodrow*; Rajkot (Kathiawar), *Woodrow*.—DISTRIB. India (W. Peninsula, Pegu, Behar, Chota-Nagpur, Orissa); Ceylon, Ava, Tropical and S. Africa.

3. **Blepharis molluginifolia,** *Pers. Syn.* v. 2 (1807) p. 180. Stems prostrate, wiry, slender, more or less hispid. Leaves subsessile in a whorl of 4, unequal, fleshy, ⅓–1 by $\frac{1}{6}$–$\frac{1}{3}$ in., oblong-obovate, usually

obtuse, mucronate, entire, more or less hairy or minutely scabrous, pale beneath. Flowers sessile, solitary, axillary; bracteoles 10 in opposite pairs; those of the first (outermost) pair $\frac{1}{10}$ in., of the second pair $\frac{1}{8}$ in., of the third $\frac{1}{6}$ in., and of the fourth $\frac{1}{4}$ in. long, all broadly obovate concave, strongly 3-nerved, furnished on the rounded apical margins with a row of long, gland-tipped, shortly retrorsely-hairy bristles, the fifth (innermost) pair of bracteoles unlike the others, $\frac{3}{8}$ in. long (including the apical mucro), oblong or oblong-spathulate with a long spinulose mucro about $\frac{1}{10}$ in. long in the centre of the apex, sometimes with 1 or 2 shorter ones by its side. Calyx divided nearly to the base; segments linear-lanceolate, acute, with membranous margins, one segment exceeding $\frac{3}{5}$ in. long, acuminate, strongly 3-nerved, the opposite segment very little shorter, acutely 2-toothed at the apex, 2-nerved (a nerve running into each tooth), the lateral segments $\frac{1}{3}$ in. long, 1-nerved. Corolla blue, $\frac{3}{8}$ in. long; tube $\frac{1}{10}$ in. long; lower lip pubescent on both sides, the lobes $\frac{1}{16}$ in. long, obtuse, the mid-lobe the narrowest. Capsules $\frac{1}{4}$ in. long, ellipsoid, compressed, glabrous, completely enclosed in the persistent sepals, 2-seeded. Seeds $\frac{1}{6}$ in. long, broadly ellipsoid, compressed, with hairs which when moistened are much longer than the nucleus. Fl. B. I. v. 4, p. 479; Grah. Cat. p. 160; Dalz. & Gibs. p. 192; Trim. Fl. Ceyl. v. 3, p. 316; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Sept.-Oct. VERN. *Kántemaka.*

KONKAN: growing freely near the sea, *Nairne*; Bassein, *Dalzell & Gibson.* DECCAN: Poona, *Woodrow!* S. M. COUNTRY: Belgaum, *Ritchie*, 1949!; Badami, *Woodrow.* GUJARAT: Ahmedabad, *Cooke!*; Kernali, *Kanitkar!*—DISTRIB. India (W. Peninsula, Chota-Nagpur, Delhi); Ceylon, Tropical and S. Africa.

In this, as in the 2 preceding species, I have called the bracts immediately beneath the calyx "*bracteoles*," which, considering their position relatively to the calyx, seems to me a better name than *bracts*. There appears to be much diversity of opinion among authors as to the most suitable term to employ for them, some authors considering the inner pair only to be *bracteoles*, while one author describes the flowers of *B. molluginifolia* as bracteolate in one publication, ebracteolate in another.

4. **Blepharis sindica,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 500. A small dichotomously branched shrub; stem usually very short, sometimes almost 0; branches ash-colored, slender, subterete, clothed with very short hairs. Leaves sessile in a whorl of 4, unequal, 1–2½ by $\frac{1}{16}$–$\frac{1}{6}$ in., linear, acute, sometimes with a few small spinous teeth near the base, finely apiculate, rough with short stiff hairs, margins recurved, midrib strong beneath. Flowers in strobilate subsessile hairy spikes 1–3 in. long, in the forks of the branches, solitary or few or many together on the top of a very short stout woody peduncle, usually numerous in the lowest fork, solitary in the upper; bracts quadrifarious, ½–1 by ⅓–½ in., the lowest the smallest, hairy on both sides, ovate, suddenly acuminate, spinous-pointed, 5-nerved, more or less recurved above, the upper part of each armed with long, distant, usually recurved sharp slender spines; bracteoles 2 beneath the calyx, rather less than ½ in. long, lanceolate, acute, hairy and ciliate, reticulately veined and with a strong midnerve. Calyx divided almost to the base, softly hairy on both surfaces; the larger segment ½ by ¼ in., ovate, shortly and bluntly acuminate, truncate at the apex, 7-nerved, the 3 midnerves parallel and continued beyond the truncate densely ciliate apex into 3 bristly teeth; the opposite calyx-segment ⅜ by ⅕ in.,

of similar shape, the 3 parallel nerves less strong, not produced into teeth at the truncate or slightly emarginate ciliate apex; lateral segments ⅓ in. long, ovate, acute, 1-nerved. Corolla ⅓–½ in. long; middle lobe of lower lip quadrate, truncate, twice as long and twice as broad as the rounded lateral ones; tube ⅛ in. long, constricted below the limb. Capsules ⅓ by ⅛ in., ellipsoid, compressed, narrowed at both ends, glabrous, shining. Seeds ⅛ in. long, ovoid, compressed, densely clothed with thick hairs which are longer than the nucleus. Fl. B. I. v. 4, p. 479; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356. *Acanthodium grossum*, Wight, Icon. tt. 1535 & 1536 (middle lobe of the lower lip of the corolla not well shewn), *not* of Nees.—Flowers: Aug.–Sept. VERN. *Jasad.*

Tolerably common in Sind, also found at Deesa. GUJARAT: Deesa, *Stocks*! SIND: *Stocks*!, *Dalzell*, 29!, *Woodrow*!, *Bhola Puran*!; Karachi, *Cooke*!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (Panjáb).

Very near to *Blepharis linariæfolia* (Pers. Syn. v. 2 (1807) p. 180), a Tropical African plant, from which, however, I consider it distinct. The corolla differs from that of the African plant. T. Anderson in Journ. Linn. Soc. v. 7, p. 36, and in several manuscript notes which I have seen, is most emphatic in his opinion as to the non-identity of the 2 species.

EXCLUDED SPECIES.

BLEPHARIS EDULIS, Pers. Syn. v. 2 (1807) p. 180. This plant, which is said to occur in Sind, has not been hitherto found in that Province. The specimens in Herb. Kew. collected by Stocks are all from Beluchistan. The plant is widely distributed, occurring in Abyssinia, Nubia, Egypt, Arabia Petræa and Arabia Felix, and Persia.

8. **ACANTHUS,** Linn.

Erect or twining herbs or shrubs. Leaves pinnatifid, toothed, spinous or rarely entire. Flowers in terminal densely strobilate or interrupted spikes; bracts large, ovate, spinescent or small; bracteoles large, lanceolate, rarely 0. Calyx divided almost to the base; segments 4, in 2 opposite pairs, the outer the larger. Corolla 2-lipped; upper lip subobsolete, the lower lip blue or white, elongate, obovate, shortly obtusely 3-lobed. Stamens 4, didynamous, shorter than the lower lip; filaments stout, narrowed, curved below the anther, not produced at the apex; anthers oblong, 1-celled, bearded. Disk 0. Ovary 2-celled; ovules 2 in each cell; style acute at the tip; stigma shortly 2-fid. Capsule ellipsoid, compressed, shining, brown, 4-seeded. Seeds compressed, orbicular, glabrous; testa lax.—DISTRIB. Species about 10, extending from S. Europe and Africa to Malaya, Australia, and Polynesia.

1. **Acanthus ilicifolius,** *Linn. Sp. Pl.* (1753) p. 639. Stems several, erect, scarcely branched, cylindric, stout, glabrous. Leaves like those of the holly, 3–6 by 2–2½ in., oblong or elliptic, usually pinnatifid or toothed, rigid, acute or truncate at the apex, with sharp spinous teeth on the margin terminating the lateral nerves and the midrib; nerves strong and conspicuous; petioles ¼ in. long, each with 2 stipule-like spines at the base. Flowers sessile in opposite pairs, in terminal crowded or interrupted spikes varying much in length (4–15 in.); bracts ½–⅔ in. long, ovate, acute, glabrous; bracteoles similar, ¼–⅓ in. long. Calyx glabrous; outer segments ⅝ in. long, elliptic-oblong, obtuse, mucronulate;

inner segments ½ in. long, oblong, rounded and ciliate at the apex, slightly apiculate. Corolla 1¼–1¾ in. long, blue; lower lip obovate, nearly 1 in. broad, hairy on the upper surface, very shortly 3-lobed, the lobes rounded, the middle one much narrower than the lateral. Filaments thick, glabrous, slightly striate; anthers densely bearded. Style glabrous. Capsules 1 in. long, oblong, obtuse, apiculate, brown, smooth and shining. Seeds ¼ in. in diam., broadly ovoid or suborbicular, much compressed; testa very lax. Fl. B. I. v. 4, p. 481; Grah. Cat. p. 159; Trim. Fl. Ceyl. v. 3, p. 317; Talb. Trees, Bomb. ed. 2, p. 264; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356; Watt, Dict. Econ. Prod. v. 1, p. 66. *Dilivaria ilicifolia*, Juss. Gen. (1789) p. 103; Wight, Icon. t. 459; Dalz. & Gibs. p. 192.—Flowers: Apr.–May. VERN. *Márándi.*

Common along the coast in tidal swamps and along the banks of creeks and tidal rivers.—It is often called the *Sea Holly.*—DISTRIB. Sea-coast of India; Ceylon, Malaya, Philippines, Australia, Tropical and S. Africa.

9. **ASTERACANTHA,** Nees.

A stout herb growing in wet places; stems numerous, fasciculate, spinous at the nodes. Leaves narrow, lanceolate, in whorls of 6, the 2 outer leaves of the whorl the larger. Flowers in sessile axillary verticels surrounded by rigid spines; bracts leaf-like; bracteoles linear-lanceolate. Calyx 4-partite to the base or nearly so, the upper sepal the broader. Corolla deeply bilabiate, the upper lip 2-lobed, the lower 3-lobed and with 2 callosities on the palate. Stamens 4, didynamous; anthers 2-celled, equal, the cells parallel, glabrous, muticous. Ovary 2-celled; ovules 4 in each cell; style pubescent; stigma simple, acuminate. Capsule 2-celled, compressed, 4–8-seeded at the base. Seeds hygroscopically white-hairy, supported on hard retinacula.—DISTRIB. Tropical and Subtropical Asia and Africa; species 1.

I have followed Lindau (Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 297) in separating this from *Hygrophila* and restoring it to its pristine rank as a distinct genus.

1. **Asteracantha longifolia,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 90. A stout herb with numerous fasciculate usually unbranched subquadrangular erect stems 2–5 ft. high, thickened at the nodes, more or less hispid with long hairs, especially below each node. Leaves sparsely hispid on both sides, tapering at the base, sessile (or at least without clearly defined petioles), in verticels of 6 at a node, the 2 outer leaves of the whorl large, reaching 7 by ½–1¼ in., oblong-lanceolate or oblanceolate, the 4 inner leaves reaching about 1½ in. long, each of the 6 leaves with a nearly straight sharp yellow spine, 1–1¾ in. long, in its axil. Flowers in a whorl of 8 (in 4 pairs) at each node; bracts about 1 in. long, like the leaves, lanceolate, hairy and ciliate; bracteoles ¾ in. long, linear-lanceolate, with hyaline margins in the lower part, hairy and ciliate with long white hairs. Calyx 4-partite; upper sepal ⅝–¾ in. long, broader than the other 3, which are ½ in. long, all linear-lanceolate, coarsely hairy on the back, and with hyaline ciliate margins. Corolla purple-blue, reaching 1¼ in. long, widely 2-lipped; tube ⅝ in. long, abruptly swollen at the top; lips subequal, ⅝ in. long, the upper lip 2-fid with oblong truncate lobes, the lower lip with 2 entire crest-like longitudinal folds or callosities on the palate, deeply 3-lobed, the lobes

oblong or slightly obovate, rounded or truncate. Filaments quite glabrous, one short and one long filament of each pair united at the base. Style slightly pubescent, filiform. Capsules ⅓ in. long, linear-oblong, pointed, 4-8-seeded. DC. Prodr. v. 11 (1847) p. 247; Wight, Icon. t. 449; Dalz. & Gibs. p. 189; Lindau, in Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 297. *Barleria longifolia*, Linn. Amœn. Acad. v. 4, p. 320; Grah. Cat. p. 161. *Hygrophila spinosa*, T. Anders. in Thw. Enum. (1860) p. 225; C. B. Clarke, in. Hook. f. Fl. B. I. v. 4, p. 408; Trim. Fl. Ceyl. v. 3, p. 293; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355; Watt, Dict. Econ. Prodr. v. 4, p. 316.—Flowers: June–Jan. VERN. *Kolshindá* (plant); *Tálimkhána* (seeds).

Common throughout the Presidency in swampy places. KONKAN: *Stocks*!; Bombay, *Law*!; Neral, *Cooke*! DECCAN: widely, *Woodrow*; Poona, *Cooke*!, *Woodrow*!—DISTRIB. Throughout India; Ceylon, Tropical and S. Africa.

The whole plant, as well as its root and seeds, is used medicinally. The seeds are an article of commerce in Indian markets. See Watt, Dict. Econ. Prod. l. c.

10. **HYGROPHILA,** R. Br.

Herbs, occasionally spinescent. Leaves opposite, lanceolate or ob-ovate, entire. Flowers sessile in terminal heads or axillary whorls; bracts elliptic or lanceolate; bracteoles linear or lanceolate. Calyx tubular, 5-fid; teeth lanceolate or linear. Corolla bluish-purple, 2-lipped; tube swollen at top; lobes twisted to the left in bud. Stamens 4, didynamous, the upper pair similar to the lower or smaller, or sometimes rudimentary; filaments glabrous; anthers oblong, the cells equal, divaricate or connate at the base. Ovary 2-celled, oblong, with a hairy tip; ovules 4–many in each cell (rarely 2); style long, hairy; stigma simple, linear. Capsule linear or narrowly oblong, bearing seeds from the base. Seeds few, ovoid, compressed, hygroscopically white-hairy; retinacula hardened, acute, curved.—DISTRIB. Tropical and subtropical regions; species exceeding 20.

Flowers in terminal spikes.	
Stamens 2 fertile, the upper pair reduced to teeth; seeds 20 or more	1. *H. polysperma.*
Stamens 4 fertile, the anthers of the upper pair ½ as long as those of the lower; seeds 8–10	2. *H. Serpyllum.*
Flowers in axillary whorls. Stamens 4; anthers subequal; seeds 20–28	3. *H. angustifolia.*

1. **Hygrophila polysperma,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 456. A small procumbent herb 6–12 in., much-branched, the branches often rooting near the base. Leaves subsessile, variable, ½–1½ by ⅛–½ in., from narrowly oblong to ovate, subobtuse, entire or nearly so, mostly glabrous, base usually tapering. Flowers in terminal dense oblong spikes 1–4 in. long; bracts ¼–½ by ⅛ in., elliptic-oblong, obtuse, pubescent on both sides and with a strong midnerve; bracteoles ¼ in. long, linear (less than $\frac{1}{20}$ in. broad). Calyx tubular, ⅛ in. long, pubescent, divided rather more than ½-way down; teeth 5, narrowly linear, hairy, with scarious ciliate margins. Corolla ⅜ in. long, pale-blue, 2-lipped, pubescent. Stamens 2 fertile, the upper stamens reduced to teeth; filaments filiform; anther-cells parallel, equal, muticous. Capsules ⅜ by $\frac{1}{16}$ in., narrowly oblong, very shortly apiculate, glabrous; valves recurved after dehiscence. Seeds 20–32, orbicular, on hard

slender curved retinacula. Fl. B. I. v. 4, p. 406; Aitch. Pb. & Sind Pl. p. 111; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Hemiadelphis polysperma*, Nees, in Wall. Pl. As. Rar. v. 3, p. 80; Wight, Icon. t. 1492.—Flowers: Sept.–Oct.

S. M. Country: north of Dharwar, *Ritchie*, 1152! Kanara: Hangal, *Bhiva*! Gujarat: Verâwal (Kathiawar), *Woodrow*!; Rajkot (Kathiawar), *Woodrow*! Sind: *Stocks*!—Distrib. Throughout India in wet places; Afghanistan.

2. **Hygrophila Serpyllum,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 456. A procumbent herb; rootstock woody; stem 4–15 in. long, glabrous or sparsely hairy. Leaves $\frac{3}{8}$–$1\frac{1}{4}$ by $\frac{1}{4}$–$\frac{5}{8}$ in., elliptic or sometimes suborbicular, entire, more or less hairy on both sides; petioles $\frac{1}{8}$ in. long (sometimes in some of the basal leaves $\frac{1}{2}$–1 in. long). Flowers in terminal dense or lax spikes; bracts $\frac{1}{4}$ in. long, elliptic, subacute, hairy; bracteoles $\frac{1}{4}$ in. long, oblong or oblong-lanceolate, subacute, hairy. Calyx $\frac{1}{5}$–$\frac{1}{4}$ in. long; sepals narrowly linear, densely ciliate. Corolla $\frac{1}{2}$ in. long; limb about $\frac{1}{5}$ in. long, conspicuously 2-lipped, the upper lip shorter than the lower, with 2 short oblong obtuse lobes, the lower lip bullate, shortly 3-lobed, the mid-lobe slightly larger than the lateral ones; tube ventricose upwards. Filaments glabrous; anthers of the lower stamens the larger, $\frac{1}{12}$ by $\frac{1}{30}$ in., those of the upper stamens $\frac{1}{25}$ by $\frac{1}{40}$ in. Style pubescent. Capsules $\frac{1}{4}$ in. long, linear-oblong, pointed, glabrous; valves grooved on the back. Seeds 8–10, orbicular-ovoid. Fl. B. I. v. 4, p. 406; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Physichilus Serpyllum*, Nees, in Hook. Comp. Bot. Mag. v. 2, p. 311; Dalz. & Gibs. p. 184; Wight, Icon. t. 1493.—Flowers: Sept.–Jan. Vern. *Rân-tewan.*

Konkan: *Law*, 148!, *Stocks*!, *Dalzell*!; island of Bombay, *Dalzell & Gibson*; Panvel, *Kanitkar*! Deccan: *Stocks*!; Khandala, *Cooke*!; Mahableshwar, *Cooke*!; Poona, *Woodrow*!—Distrib. India (W. Peninsula).

Var. *Hookeriana*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 407. A larger plant. Leaves orbicular, obtuse, often 1 in. in diam.; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long, with minute white bristly hairs.

Konkan: *Stocks*!, *Law*!

3. **Hygrophila angustifolia,** *R. Br. Prodr.* (1810) p. 479. Herbaceous, erect, often much-branched, 1–3 ft. high; stems obtusely subquadrangular, glabrous or with finely appressed pubescence. Leaves glabrous, usually entire, variable, $\frac{3}{4}$–3 by $\frac{1}{4}$–$\frac{5}{8}$ in.; lower sometimes obovate or oblong; upper lanceolate; petioles 0–$\frac{1}{4}$ in. long. Flowers sessile, in dense opposite axillary clusters forming rather distant whorls; bracts $\frac{1}{6}$ in. long, oblong, subobtuse, hairy; bracteoles $\frac{1}{8}$ in. long, lanceolate, acute, hairy. Calyx tubular, divided $\frac{1}{2}$-way down in flower; teeth linear from a broad base, acute, hairy. Corolla hairy outside, pale purplish-blue, $\frac{1}{2}$–$\frac{2}{3}$ in. long; tube much and abruptly swollen above, hairy within at and below the insertion of the stamens; limb conspicuously 2-lipped, the upper lip ovate-oblong, shortly 2-lobed, the lower lip $\frac{1}{5}$–$\frac{1}{4}$ in. long, oblong, hairy inside and with 3 short subequal rounded lobes. Stamens didynamous; filaments hairy at the base. Style pubescent. Capsules $\frac{1}{2}$–$\frac{2}{3}$ in. long, narrow, subquadrangular. Seeds 20–28, orbicular. *Hygrophila salicifolia*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 81; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 407;

Wight, Icon. t. 1490; Dalz. & Gibs. p. 184; Trim. Fl. Ceyl. v. 3, p. 293; Watt, Dict. Econ. Prod. v. 4, p. 315.—Flowers: Dec.

KONKAN: *Stocks*!; wet places in S. Konkan, *Dalzell & Gibson*. KANARA: Supa, inundated banks of the Kála naddi, *Ritchie*, 1209!—DISTRIB. More or less throughout India; Ceylon.

EXCLUDED SPECIES.

HYGROPHILA STOCKSII, T. Anders. MS. ex C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 407. The specimens on the single sheet in Herb. Kew. (*Physichilus* no. 4 in Herb. Hook. & Thoms.) are clearly nothing more than luxuriant forms of *H. Serpyllum*. The anthers are the same as in that species, giving the same measurements. The sheet bears in one corner *in pencil* the words *Hygrophila Stocksii*, T. Anderson, but there is no evidence to shew when this was written. It might have been subsequent to or have been prior to the publication of Anderson's Indian Acanthaceæ in v. 9 of the Journal of the Linnean Society (1867). Dr. Anderson died in 1870. In the publication referred to, however (p. 456), T. Anderson makes the following remarks (quoted below *in extenso*) regarding these very same specimens:—

"This is evidently a variable plant and is much influenced by the nature of the soil in which it is found. Some luxuriant forms of it were distributed in the Indian Herbarium of Drs. Hooker & Thomson under the numbers *Physichilus* sp. 2, 3, and 4."

11. **RUELLIA,** Linn.

Herbs or undershrubs. Leaves opposite, subentire. Flowers sessile or subsessile, solitary or in clusters or racemes; bracts 0; bracteoles large, usually exceeding the calyx. Calyx 5-partite or 5-fid; segments subequal, narrow, acute. Corolla oblique; tube ventricose; lobes subequal, rounded, twisted to the left in bud, spreading in flower. Stamens 4, didynamous; filaments glabrous or sometimes hairy at the base; anthers subequal, 2-celled, the cells oblong, muticous, glabrous; pollen globose, reticulate or honeycombed. Ovary 2-celled; ovules 3–10 in each cell; style linear, hairy; stigma with one oblong-linear branch, the other suppressed or nearly so. Capsule clavate, cylindric, seed-bearing upwards, solid at the base below. Seeds large, thin, discoid, margined, hygroscopically hairy; retinacula large, strong, hooked.—DISTRIB. All warm regions; species about 200.

The generic character is narrowed to the section *Dipteracanthus* (genus, *Nees*), to which the Indian species all belong.

Leaves ovate or elliptic.
- Prostrate or climbing; leaves sparsely hairy, acute; ovary and capsule pubescent ..... 1. *R. prostrata*, var. *dejecta*.
- Suberect; leaves closely pubescent on both sides, obtuse; ovary and capsule glabrous ..... 2. *R. patula*.

Leaves linear, hoary; ovary and capsule pubescent ..... 3. *R. longifolia*.

1. **Ruellia prostrata,** *Poir. Encyc. Méthod.* v. 6 (1804) p. 349, VAR. **dejecta,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1884) p. 412. Stems 6–18 in. long, straggling or climbing among bushes, much-branched, terete with long internodes, thickened and purple at the nodes, more or less pubescent. Leaves $\frac{3}{4}$–3 by $\frac{1}{2}$–$1\frac{3}{4}$ in., ovate or elliptic, acute, sparsely hairy, margins entire, base acute; petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long. Flowers nearly sessile, axillary, solitary or few together; bracteoles like the leaves but smaller, $\frac{1}{3}$–$\frac{7}{8}$ in. long (including the stalk). Calyx $\frac{1}{3}$ in. long, divided about $\frac{3}{4}$ the way down; segments linear-subulate, very acute, hairy. Corolla pale mauve-violet, $1\frac{1}{4}$ in. long,

pubescent outside; tube narrowly cylindric below, infundibuliform above; lobes ¼–⅜ in. long, obovate-oblong, rounded at the apex. Filaments glabrous. Ovary pubescent; style pubescent. Capsules ¾ in. long, slightly pubescent, clavate, pointed. Seeds 16-20, orbicular, ⅛ in. in diam., almost glabrous on the faces, with a dense fringe of hygroscopic hairs on the margin. Watt, Dict. Econ. Prod. v. 6, part 1, p. 590. *Ruellia ringens*, Roxb. Fl. Ind. v. 3, p. 44 (*doubtfully* of Linn.); Grah. Cat. p. 162; Trim. Fl. Ceyl. v. 3, p. 295. *Ruellia deccanensis*, Grah. Cat. Bo. Pl. (1839) p. 162. *Dipteracanthus dejectus* (sp.), Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 82; Dalz. & Gibs. p. 185 (exclud. syn.).—Flowers: Sept.–Oct.

KONKAN: *Stocks*!, *Nimmo* ex *Graham*, *Dalzell & Gibson*. DECCAN: *Gibson* ex *Graham*. S. M. COUNTRY: Nesri hills 20 miles west of Belgaum, *Ritchie*, 1151!—DISTRIB. Throughout India; Ceylon, East Africa.

2. **Ruellia patula,** *Jacq. Misc. Bot.* v. 2 (1781) p. 358. A small usually hoary pubescent suberect shrub; stems long, straggling, much-branched, terete or subquadrangular, densely softly pubescent. Leaves ½–1½ by ¼–1 in., ovate or elliptic, obtuse, often apiculate, closely pubescent on both sides, base rounded or sometimes shortly and abruptly narrowed; petioles ¼–¾ in. long. Flowers axillary, solitary or 2–3 together, nearly sessile; bracteoles nearly ½ in. long (including a flat stalk $\frac{1}{16}$–$\frac{1}{12}$ in. long), foliaceous, elliptic, obtuse, densely pubescent and strongly ciliate. Calyx ¼ in. long, divided rather more than ⅔ the way down, densely pubescent; segments linear-lanceolate, very acute. Corolla purplish-blue, 1–1¼ in. long, pubescent outside; tube in the lower part narrowly cylindric, in the upper part campanulate-infundibuliform; lobes of the limb ¼ in. long, broadly elliptic or suborbicular, rounded at the apex. Filaments glabrous. Ovary glabrous; style pubescent. Capsules ½–¾ in. long, clavate, glabrous. Seeds suborbicular, nearly glabrous on the faces, margined with hygroscopic white hairs. Fl. B. I. v. 4, p. 412; Grah. Cat. p. 162; Lindau, in Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 310, fig. 124 E–F; Trim. Fl. Ceyl. v. 3, p. 296; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Dipteracanthus patulus*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 82; Wight, Icon. t. 1505. *Petalidium patulum*, Dalz. & Gibs. p. 185.—Flowers: June–Nov. VERN. *Katmora.*

DECCAN: *Woodrow*; Dongergaon near Ahmednagar, *Cooke*!; Poona, *Cooke*!; Soos (near Poona), *Krishna*! S. M. COUNTRY: Gokak, *Bhiva*!; Padshapur, *Ritchie*, 1200! SIND: *Stocks*!, *Dalzell*!, *Bhola Puran*!; Jemadar ka Landa near Karachi, *Stocks*, 68!—DISTRIB. India (W. Peninsula, Rajputana, Bandelkand); Ceylon, Arabia, Tropical Africa, Ava.

3. **Ruellia longifolia,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 460. An undershrub about 1 ft. high, clothed all over with glandular hoary pubescence; stems numerous, ascending, terete, woolly at the base. Leaves 1½–3 by ⅛–¼ in. (rarely broader), linear, acute, entire; petioles continuous with the attenuated leaf-blade. Flowers usually solitary, axillary, very shortly pedicellate; bracteoles ¾ by $\frac{1}{10}$ in., linear, acute, hairy. Calyx ¼–⅓ in. long, densely strigose; segments lanceolate-subulate. Corolla ¾ in. long, pubescent outside, dusky lilac (*Stocks*); tube infundibuliform, the throat marked externally by longitudinal furrows caused by plaits which project into it (*Stocks*); lobes

short, obtuse. Filaments glabrous. Ovary pubescent; style pubescent. Capsules pubescent, $\frac{5}{8}$–$\frac{3}{4}$ by $\frac{1}{8}$ in., clavate, pointed. Seeds broadly ellipsoid, much compressed, clothed all over (very densely on the margin) with glistening white hygroscopic hairs, when dry appearing mucronate by the hairs converging at the apex. Fl. B. I. v. 4, p. 412; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355; Aitch. Pb. & Sind Pl. p. 111; Watt, Dict. Econ. Prod. v. 6, part 1, p. 589. *Dipteracanthus longifolius*, Stocks, in Kew Journ. Bot. v. 4 (1852) p. 177.

SIND: *Dalzell*, 30!, *Stocks*!, *Woodrow*.—DISTRIB. Beluchistan.

Ruellia Baikiei, Woodr. Gard. in Ind. ed. 5 (1889) p. 417. An undershrub, a native of Brazil, producing racemes of trumpet-shaped scarlet flowers from September to April, grown in gardens. *Siphonacanthus repens*, Nees, in Mart. Fl. Bras. v. 9 (1847) p. 47. *Stephanophysum Baikiei*, Hook. Bot. Mag. (1859) t. 5111. *Stephanophysum repens*, T. Anders. in Journ. Linn. Soc. v. 7 (1864) p. 25.

As there is already a *Ruellia repens*, Linn. Mantiss. p. 89, the specific name given by Nees cannot be adopted.

12. **HEMIGRAPHIS,** Nees.

Herbs or shrubs. Leaves opposite, toothed or subentire. Flowers sessile, in heads or spikes terminal or pseudo-axillary on shortened branchlets, rarely paniculate or solitary; bracts large, imbricate, each 1-flowered; bracteoles small, narrow or 0. Calyx 5-partite nearly to the base; segments unequal, lanceolate or linear. Corolla elongate; tube cylindric below, infundibuliform or ventricose above; lobes 5, rounded, subequal, twisted to the left in bud. Stamens 4, didynamous, included or nearly so; anthers oblong, 2-celled, muticous, sometimes triangular, the bases acute. Ovary 2-celled; ovules 3–8 in each cell; style long; stigma 2-lobed, one lobe linear, the other very short. Capsule linear or linear-oblong, seed-bearing almost from the base. Seeds 6–20, compressed, discoid, brown with a white margin.—DISTRIB. Species 20, mostly Indian and Malayan, 3 in Africa.

Upper part of longer filaments glabrous; capsule glabrous.
A densely bristly (almost prickly) herb ..... 1. *H. dura.*
Upper part of longer filaments bearded; capsule minutely pubescent.
Bracts of inner flowers not longer than the calyx; seeds 6 ... 2. *H. latebrosa.*
Bracts of inner flowers longer than the calyx; seeds 8–10 ... 3. *H elegans*, var. *crenata.*

1. **Hemigraphis dura,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 461 (exclud. syn. *Ruellia crispa*). A procumbent or diffuse branched densely bristly herb (almost prickly from the strong sharp bristles); stems 1–2 ft. long. Leaves 1–1½ by $\frac{3}{8}$–$\frac{1}{2}$ in., oblong, obtuse, subcrenate, hispid with long hairs, attenuated into a short petiole. Flowers in dense many-flowered heads densely clothed with white and yellowish-brown hair; bracts $\frac{3}{4}$–1 long, oblong or spathulate, subacute, densely clothed and ciliate with jointed white and yellowish-brown hairs; bracteoles 0. Calyx ½ in. long, divided almost to the base; segments linear, acute, densely hairy and ciliate with long jointed hairs, the hairs near the apex yellowish-brown and stiffer than the white marginal ones.

Corolla blue, 1 in. long; tube slender, the cylindric part about as long as the ventricose portion; lobes obovate, rounded, nearly ⅓ in. long. Stamens scarcely exserted beyond the corolla-tube; filaments glabrous. Ovary glabrous; style pubescent. Capsules ½ in. long, linear-oblong, pointed, grooved, glabrous. Seeds 6–8, broadly ellipsoid or suborbicular, $\frac{1}{16}$ in. in diam., yellowish-brown. Fl. B. I. v. 4, p. 422; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Ruellia dura*, Nees, in DC. Prodr. v. 11, p. 146; Dalz. & Gibs. p. 186.—Flowers: Jan.-Feb. VERN. *Gantelbu.*

KONKAN: *Gibson*! S. M. COUNTRY: Belgaum, *Ritchie*, 1196! GUJARAT: Surat, *Dalzell*!, *Kanitkar*!, *Bhiva*! SIND: *Cooke*!—DISTRIB. India (Central India, W. Peninsula).

2. **Hemigraphis latebrosa,** *Nees, in DC. Prodr.* v. 11 (1847) p. 723. A diffuse weak herb; stems slender, obtusely subquadrangular, clothed with soft white hairs. Leaves 1–3 by ¾–1¾ in., ovate, acuminate, coarsely crenate-serrate, sparsely hairy on both sides with short often bulbous-based hairs (the leaves on the secondary flowering branches smaller), base cuneate; petioles ½–1½ in. long. Flowers in axillary and terminal heads (reduced spikes); bracts elliptic, acute, those of the outer flowers much longer than the calyx, those of the inner flowers scarcely longer than the calyx, all hairy and with densely ciliate margins; bracteoles 0. Calyx ⅓ in. long, divided nearly to the base, one of the segments longer than the other 4, all linear, acute, whitish below, green at the tip, hairy and ciliate. Corolla ½–⅝ in. long, narrowly tubular, nearly straight; tube whitish, slightly enlarged upwards; limb blue, with obovate obtuse lobes ⅛ in. long. Longer filaments of the stamens densely bearded in the upper part with long white hairs, the shorter filaments glabrous. Ovary minutely pubescent at the apex. Capsules ¼ in. long, minutely pubescent, 6-seeded. Seeds $\frac{1}{16}$ in. in diam., broadly ellipsoid or suborbicular, yellowish-brown, clothed with white hairs. Fl. B. I. v. 4, p. 423; Wight, Icon. t. 1504; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Ruellia elegans*, Bot. Mag. (1835) t. 3389; Grah. Cat. p. 162; Dalz. & Gibs. p. 186.—Flowers: Dec.

KONKAN: *Stocks*!, *Law*!; Kanheri, *Dalzell*!; Revadanda, *Woodrow*; Marmagão, *Kanitkar*! DECCAN: hills about Pár, *Stocks*!; Khandala, *Cooke*!, *Woodrow*! KANARA: Kála naddi, *Ritchie*, 586!—DISTRIB. India (W. Peninsula).

VAR. 1. *rupestris*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 424. More rigid and pubescent, often viscidly so; heads denser.

KONKAN: *Law*!, *Stocks*!, *Ritchie*!

VAR. 2. *ebracteata.* Leaves smaller, ¾–1½ by ½–1 in., broadly ovate, acute or subobtuse; hairs stiff, almost bristly, especially on the nerves beneath. Capsules ¼–⅓ in. long, pubescent, 6-seeded (*C. B. Clarke*). *Hemigraphis ebracteolata* (sp.), C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 424. *Ruellia ebracteata* (not *ebracteolata* as cited in Fl. B. I. l. c.), Dalzell, in Kew Journ. Bot. v. 2 (1850) p. 342. *Ruellia latebrosa*, Dalz. & Gibs. Bo. Fl. (1861) p. 186.—Flowers: cold season. Dalzell, who in 1850 (Kew Journ. Bot. l. c.) made this a species distinct from *H. latebrosa*, combined it with that species in 1861 (Bo. Fl. l. c.).

KONKAN: *Stocks*!, *Dalzell*!

3. **Hemigraphis elegans,** *Nees, in DC. Prodr.* v. 11 (1847) p. 722, VAR. **crenata,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1884) p. 425. Diffuse; stems subquadrangular, viscidly pubescent. Leaves 1–1¾ by ¾–1¼ in., ovate or elliptic, subobtuse, crenate, hairy, base shortly cuneate; petioles ¼–½ in. long. Flowers in glandular-hairy heads; bracts elliptic-oblong, subobtuse, those of the inner flowers longer than the calyx, glandular-hairy and strongly ciliate; bracteoles 0. Calyx to top of longest segment reaching $\frac{7}{16}$ in. long, divided nearly to the base, one of the segments longer than the other 4; segments linear, subobtuse, glandular-hairy and ciliate. Corolla ¾ in. long; tube whitish; limb blue, with obovate rounded lobes ⅛ in. long. Longer filaments of the stamens bearded in the upper part. Capsules ⅓ in. long, pubescent, 8–10-seeded. Seeds $\frac{1}{16}$ in. in diam., densely clothed with hygroscopic white hairs. *Ruellia crenata,* Benth. ex Hohenhack. in Flora, v. 32 (1849) p. 558.—Flowers: Dec.

KONKAN: *Law*!, *Stocks*! S. M. COUNTRY: Belgaum, *Ritchie,* 586! KANARA: *Hohenhacker,* 737!—DISTRIB. India (W. Peninsula).

13. **PETALIDIUM,** Nees.

Undershrubs. Leaves usually entire. Flowers shortly pedicellate, in contracted cymes sometimes reduced to single flowers, often crowded on shortened lateral branches; bracts small, narrow or 0; bracteoles 2, large, ovate, concave, reticulately veined, ultimately more or less scarious. Calyx divided into 5 unequal narrow-lanceolate segments. Corolla straight or curved; tube dilated in the upper half or infundibuliform only at the very top; lobes 5, subequal, twisted to the left in bud. Stamens 4, didynamous; anthers subsimilar, 2-celled, the cells parallel, shortly spurred or muticous at the base; pollen ellipsoid, few-ribbed, stopples 3 with (nearly always) 1 tubercle above and 1 below each stopple. Ovary 2-celled; ovules 2 in each cell; style long; stigma with 2 unequal lobes. Capsule clavate, compressed. Seeds 2 or 4, discoid, hygroscopically hairy, on placentas that separate elastically from the bottom of the capsule carrying the seeds with them.—DISTRIB. Species 18, of which 1 is in India, the rest in Africa and the Mascarene Islands.

1. **Petalidium barlerioides,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 82. Shrubby, 2–4 ft. high; stems numerous, subterete, glabrous. Leaves on the main stems 2–4 by 1½–2½ in., broadly ovate, acuminate, crenate-serrate, glabrous or nearly so except on the nerves beneath, base usually rounded; main nerves 6–8 pairs, prominent, with reticulate veins between them; petioles ⅜–¾ in. long: leaves on the short flower-bearing branches smaller, ½–1½ in. long. Flowers solitary, usually crowded on abbreviated lateral branches; bracteoles ¾–1 in. long, foliaceous, ovate, acuminate, strongly nerved and reticulately veined, green at first, becoming pale-brown and scarious in age, ciliolate; pedicels ¼–½ in. long. Calyx glandular-hairy, reaching ⅜ in. long to top of longest segment; tube $\frac{1}{10}$ in. long; segments lanceolate-subulate, one of them longer than the others. Corolla white, reaching 1½ in. long, pubescent outside, strongly nerved, the palate with long deflexed hairs within; tube ventricose upwards; lobes ½ in. long, obovate, obtuse, with irregularly crenate margins. Filaments hairy at

the base; anthers $\frac{1}{5}$ in. long, oblong, slightly pubescent, the cells with spurs $\frac{1}{30}$–$\frac{1}{25}$ in. long at the base. Ovary glabrous; style pubescent. Capsules $\frac{1}{2}$–$\frac{5}{8}$ in. long, glabrous, clavate, pointed. Seeds usually 2, orbicular, reaching $\frac{1}{5}$ in. in diam., softly villous, especially on the margin. Fl. B. I. v. 4, p. 416; Dalz. & Gibs. p. 185; Lindau, in Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 299, fig. 120 J; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Ruellia bracteata*, Roxb. Fl. Ind. v. 3 (1832) p. 47; Grah. Cat. p. 162.—Flowers: Feb.–Apr.

KONKAN: *Law*!; Ghâts, *Stocks*!; hills near Panvel, *Nimmo* ex *Graham*. KANARA: north of Haliyal, *Ritchie*, 1935! GUJARAT: Dangs, *Woodrow*.—DISTRIB. More or less throughout India.

14. **MICRANTHUS,** Wendl. Bot. Beob. (1798) p. 38.

PHAYLOPSIS, Willd. Sp. Pl. v. 3 (1800) p. 342.

Perennial prostrate or diffuse herbs. Leaves opposite, membranous, petiolate, entire or obscurely crenate. Flowers in dense terminal 1-sided spikes; bracts orbicular, closely imbricate, each usually 3-flowered; bracteoles 0. Sepals 5, one large like the bracts, ovate, nerved, the others linear-subulate. Corolla small; tube slender, cylindric; lobes slightly unequal, rounded, contorted in bud, spreading in flower. Stamens 4, didynamous; anthers subsimilar, 2-celled, the cells parallel, shortly oblong, minutely mucronate at the base. Ovary 2-celled; ovules 2 in each cell; style long, hairy; stigma of 2 subulate lobes, the upper lobe much the smaller or almost wanting. Capsule clavate, compressed parallel to the septum. Seeds 4 (rarely fewer), discoid, compressed, on placentas separating elastically from the base of the capsule and raising the seeds with them.—DISTRIB. India, Africa, Mascarene Islands; species 15.

There can be no question as to the priority of the genus *Micranthus*; indeed Willdenow admits its priority, but gives no reason why that genus should be set aside and his own genus *Phaylopsis* substituted for it. Unfortunately Ecklon [Top. Verz. (1827) p. 43] has given the name *Micranthus* to a genus of *Iridaceæ*, for which, however, O. Kuntze has found another name. The genus above was founded by Wendland on *Micranthus oppositifolius*, the only *Indian* species of the genus.

1. **Micranthus oppositifolius,** *Wendl. Bot. Beob.* (1798) p. 39. A perennial herb 1–2 ft.; stems diffuse, slender, often prostrate, much divaricately branched, thickened at the nodes and sometimes rooting at the lower ones. Leaves very variable in size, on the same stem varying from $\frac{1}{2}$–3 by $\frac{3}{8}$–$1\frac{1}{2}$ in., the leaves of each pair usually very unequal, ovate, acuminate, more or less pubescent, entire or subcrenate, base tapering and often unequal-sided; petioles $\frac{1}{2}$–$1\frac{1}{4}$ in. long. Flowers sessile, in softly pubescent spikes 1–$1\frac{1}{2}$ in. long, usually in threes enclosed by a large bract; bracts cordate, reniform or orbicular, $\frac{1}{3}$ in. long, usually broader than long (often $\frac{1}{2}$ in. wide), softly glandular-hairy and strongly ciliate, veined, green at first, turning white in age. Calyx glandular-hairy, divided nearly to the base; segments 5, one of them large and leaf-like, $\frac{1}{3}$ by $\frac{1}{5}$ in., broadly ovate, obtuse, densely pubescent and strongly ciliate, the other 4 segments linear-subulate, $\frac{1}{4}$ in. long. Corolla $\frac{1}{4}$–$\frac{1}{3}$ in. long, white, glabrous; tube slightly contracted about the middle; lobes $\frac{1}{16}$ in. long, oblong, rounded. Filaments glabrous. Ovary pubescent at the apex; style faintly pubescent; upper lobe of stigma distinct

but small. Capsules $\frac{1}{5}$–$\frac{1}{4}$ in. long, clavate, pointed, pubescent at the apex, with hard backs and scarious sides. Seeds orbicular, $\frac{1}{16}$ in. in diam., dark brown, slightly hairy on the faces, densely so on the margin. *Phaylopsis parviflora*, Willd. Sp. Pl. v. 3 (1800) p. 342; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 417; Trim. Fl. Ceyl. v. 3, p. 296; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Ætheilema reniforme*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 94; Wight, Icon. t. 1533; Dalz. & Gibs. p. 192. *Ruellia imbricata*, Vahl, Symb. v. 2, p. 73; Grah. Cat. p. 162.—Flowers: Nov.–Jan. VERN. *Waiti*.

KONKAN: *Stocks*! Banda in the Wari country, *Dalzell & Gibson*. DECCAN: Ravines about Pár, *Graham*; Mahableshwar, *Graham, H. M. Birdwood, Cooke*! S. M. COUNTRY: Badami, *Woodrow*; Belgaum, *Dalzell*! KANARA: Kála naddi, *Ritchie*, 1194! —DISTRIB. Throughout India (except the N.W.); Ceylon, Madagascar, Tropical Africa.

15. **DYSCHORISTE,** Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 75.

CALOPHANES, D. Don, in Sweet, Brit. Flow. Gard. Ser. 2 (1833) t. 181.

Perennial herbs. Leaves opposite, petiolate. Flowers in axillary clusters or short cymes; bracteoles small, narrow. Calyx tubular; lobes 5, subequal, lanceolate or subulate. Corolla tubular, obscurely 2-lipped; lobes 5, obtuse, twisted to the left in bud, spreading in flower. Stamens 4 perfect, didynamous; filaments glabrous or hairy; anthers similar, 2-celled, the cells oblong, parallel, minutely mucronate or spurred at the base; pollen globose, ribbed. Ovary 2-celled, glabrous; ovules 2 in each cell; style linear, hairy; stigma linear, recurved, the upper lobe minute, or dentiform or suppressed. Capsule oblong, contracted below into a solid base. Seeds 4, orbicular, much compressed, with hygroscopic white hairs; retinacula strong, curved.—DISTRIB. Warm parts of both hemispheres; species 60.

Corolla not or scarcely exceeding the calyx	1. *D. depressa*.
Corolla much longer than the calyx.	
Corolla $\frac{3}{4}$–1 in. long; anther-cells with long spurs at the base	2. *D. vagans*.
Corolla 1–1$\frac{1}{8}$ in. long; anther-cells with minute spurs or almost spurless at the base	3. *D. Dalzellii*.

1. **Dyschoriste depressa,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 81. A perennial herb often woody at the base, or almost a small shrub; stems numerous, usually glabrous, subquadrangular, with many divaricate usually glabrous subquadrangular branches often prostrate and rooting at the nodes. Leaves $\frac{3}{4}$–1$\frac{1}{2}$ (rarely reaching 2 in. long) by $\frac{1}{2}$–1 in., broadly elliptic or sometimes obovate, obtuse, entire, glabrous or slightly pubescent, base tapering into the petiole; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers subsessile, 1–4 in axillary clusters; bracts 0; bracteoles $\frac{1}{10}$ in. long, narrowly linear. Calyx $\frac{1}{2}$–$\frac{1}{3}$ in. long, divided about $\frac{2}{3}$ the way down in flower, hairy; segments lanceolate-subulate, the lower part of each segment with membranous margins, the upper part finely subulate. Corolla pale violet-pink, scarcely exceeding the calyx; lobes oblong, rounded-truncate, spreading. Stamens didynamous, one short and one long filament of each pair united at the base, the connate portion flattened and pubescent; anther-cells distinctly spurred at the base. Capsules $\frac{3}{8}$ in. long, bluntly pointed, glabrous. Seeds 4, large, broadly elliptic, densely clothed with hygroscopic hairs; retina-

cula hard, sharp. C. B. Clarke, in Dyer, Fl. Trop. Afr. v. 5 (1900) p. 72. *Dyschoriste erecta*, O. Kuntze, Revis. Gen. v. 1 (1891) p. 485. *Ruellia erecta*, Burm. Fl. Ind. (1768) p. 135, t. 41, fig. 3. *Calophanes Nagchana*, Nees, in DC. Prodr. v. 11 (1847) p. 109; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 410; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355.—Flowers: Apr.

Not very common. KONKAN: *Stocks*! DECCAN: Nasik, *Wadthekar*! S. M. COUNTRY: 4 miles N. of Belgaum, *Ritchie*, 599! KANARA: banks of the Kála naddi, *Ritchie*, 1151! GUJARAT: Dangs, *Woodrow*.—DISTRIB. India (Behar, W. Peninsula); Ceylon.

2. **Dyschoriste vagans,** *O. Kuntze, Revis. Gen.* v. 1 (1891) p. 486. Shrubby, diffuse, sometimes climbing among bushes (*Wight*), glandular-pubescent; stems many from the root, obtusely quadrangular. Leaves 1½–2½ by ¾–1¼ in., ovate, acute, often with subcrenate margins, more or less pubescent on both sides, base usually tapering; main nerves 6–8 pairs, prominent beneath; petioles ¼ in. long. Flowers fetid (*Ritchie*), axillary, solitary or in 2–6-flowered shortly pedunculate cymes; bracteoles ⅛ in. long, lanceolate, broader than the calyx-teeth. Calyx ½–⅝ in. long, glandular-hairy, divided about ⅔ the way down in flower, afterwards divided to the base; segments lanceolate-subulate, finely aristate. Corolla ¾–1 in. long, bluish, pubescent outside; lobes of the upper lip ⅛ in. long, oblong, rounded; lobes of the lower lip ⅙ in. long, oblong, rounded. Stamens didynamous, one of each pair of filaments united at the base, the connate portion flattened and pubescent; anther-cells with capillary white spurs about 1/40 in. long, often divaricate. Style pubescent. Capsules ½ in. long, oblong, pointed, glabrous. Seeds broadly ellipsoid, densely clothed with glistening hygroscopic hairs. *Calophanes vagans*, Wight, Icon. (1850) t. 1526; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 411.—Flowers: Sept.–Dec.

Not common in the Bombay Presidency. Without locality, *Dalzell* in Herb. Kew.! KONKAN: *Stocks*! S. M. COUNTRY: Belgaum hills, *Ritchie*, 603!—DISTRIB. India (W. Peninsula).

3. **Dyschoriste Dalzellii,** *O. Kuntze, Revis. Gen.* v. 1 (1891) p. 486. Shrubby, all parts except the capsules glandular-pubescent; stems many from the root, 1–15 in. long, obtusely subquadrangular. Leaves 1–2 by ½–1¼ in., ovate, acute, submembranous, often with subcrenate margins, base rounded or subacute; main nerves 6–8 pairs, prominent beneath; petioles ¼–⅓ in. long. Flowers pedicellate, solitary or in few (often 3)-flowered cymes on short axillary peduncles; bracteoles ¼ in. long, broader than the calyx-teeth, lanceolate, glandular-hairy, caducous; pedicels 1/12–⅛ in. long. Calyx divided about ⅔ the way down in flower, afterwards divided to the base, strigose with glandular hairs; segments lanceolate-subulate, finely aristate. Corolla bluish, 1–1½ in. long, pubescent outside; tube ventricose upwards; upper lip 2-fid, the lobes ⅛ in. long, oblong, rounded; lower lip 3-lobed, the lobes ¼ in. long, oblong, rounded. Stamens didynamous, one of each pair of filaments united at the base, the connate portion flattened and pubescent; anther-cells minutely spurred at the base (sometimes almost spurless). Style filiform, pubescent. Capsules ½–⅝ in. long, oblong, pointed, glabrous. Seeds broadly ellipsoid, densely clothed with glistening hygroscopic hairs. *Calophanes Dalzellii*, T. Anders. ex Bedd. Icon. Pl. Ind. Or. v. 1 (1874) p. 60, t. 248; C. B. Clarke, in Hook. f. Fl. B. I. v. 4,

p. 411; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355.—Flowers: Aug.–Nov.

KONKAN: *Stocks*! DECCAN: Chattersinghi hill near Poona, *Kanitkar*!; Deva Ghât near Poona, *Dalzell*!; S.W. of Poona, *Dalzell*!; rocky hills near Poona, *Beddome*. S. M. COUNTRY: Belgaum, *Ritchie*!—DISTRIB. India (W. Peninsula).

Very close to *D. vagans*, from which the short or sometimes only microscopically visible spurs of the anther-cells serve to separate it.

16. **DÆDALACANTHUS,** T. Anders.

Perennial herbs or shrubs. Leaves opposite, petiolate, entire or obscurely toothed, lineolate from imbedded cystoliths. Flowers in linear distant or close spikes or heads; bracts usually large; bracteoles linear-lanceolate, shorter than the calyx. Calyx 5-lobed; lobes narrow, often scarious. Corolla slender; tube long, narrow, widened at the mouth or in some species from the middle; lobes obovate, twisted to the left in bud, spreading in flower. Stamens 2, glabrous; anthers narrowly oblong, 2-celled, muticous, exserted or subincluded. Ovary glabrous, 2-celled; ovules 2 in each cell; style long, sparsely pubescent or glabrous; stigma simple, linear. Capsule clavate, with solid cylindric base. Seeds normally 4, compressed, discoid, hygroscopically hairy; retinacula acute.—DISTRIB. India and Malaya; species about 18.

Bracts white with green veins, obovate, obtuse, with a short reflexed mucro	1. *D. roseus.*
Bracts green, ovate, acuminate.	
Flowers in dense, usually solitary, uninterrupted spikes; bracts exceeding ¾ in. long	2. *D. purpurascens.*
Flowers in interrupted usually paniculate spikes; bracts less than ½ in. long	3. *D. montanus,* var. *concanensis.*

1. **Dædalacanthus roseus,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 487. Stems 2–6 ft. high. Leaves 5–8 by 1½–3 in., oblong-lanceolate, acuminate, lineolate on both sides, entire or obscurely crenulate, base tapering, often decurrent into the petiole; main nerves about 10 pairs, prominent below; petioles ½–1¼ in. long. Inflorescence with a strong sickly odor; flowers in linear subinterrupted lax axillary and terminal spikes often 6 in. long, solitary or occasionally 2 or 3 together forming a terminal panicle; peduncles quadrangular; bracts ⅝ in. long, obovate, with a reflexed mucro, white with very prominent raised green nerves, densely hairy on the midrib and ciliate on the margins with long hairs; bracteoles as long as or slightly longer than the calyx, narrowly linear, acute, densely clothed on the back and ciliate with long white hairs. Calyx ⅕ in. long, scarious, white-pubescent, divided about ½-way down; lobes lanceolate, very acute, with a strong midnerve from base of calyx to the apex of each lobe. Corolla always blue in the Bombay Presidency, fading to purple or red, 1–1½ in. long, slightly pubescent outside; tube slender, slightly enlarged and funnel-shaped to about ⅛ in. below the limb; lobes ⅜ in. long, oblong-obovate, rounded or truncate at the apex. Stamens exserted beyond the corolla-tube; filaments glabrous. Ovary glabrous; style glabrous or nearly so. Capsules ½ in. long, clavate, pointed, glabrous. Seeds ⅛–⅙ in. in diam., hygroscopically hairy, very densely so on the margin.—Fl. B. I. v. 4, p. 419; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355; Talb. Trees,

Bomb. ed. 2, p. 266; Watt, Dict. Econ. Prod. v. 3, p. 3. *Eranthemum roseum*, R. Br. Prodr. (1810) p. 477; Dalz. & Gibs. p. 195.—Flowers: Nov.–Jan. VERN. *Dasamuli*.

KONKAN: *Stocks*!, *Law*!, *Woodrow*!; Ghâts, *Dalzell*!; Revadanda, *Kanitkar*!; Matheran, *Cooke*! DECCAN: Khandala, *Cooke*. S. M. COUNTRY: Belgaum, *Ritchie*, 583! KANARA: N. Kanara, *Kanitkar*!; Yellapur (N. Kanara), *Talbot*, 278!; Kâla naddi, *Ritchie*, 583!—DISTRIB. India (W. Peninsula).

The root boiled in milk has some repute in native medicine.

2. **Dædalacanthus purpurascens,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 488. Stems 2–4 ft. high, leafy. Leaves 2–8 by 1–3½ in., ovate, acuminate, lineolate on both surfaces, the lower leaves usually decurrent into the petiole, which is variable in length owing to the decurrent leaf-blade, the upper leaves often rounded or cordate at the base and shortly petiolate; main nerves 7–9 pairs, prominent beneath. Flowers in dense spikes 1–3 in. long, usually solitary, but sometimes 1–3 forming a terminal panicle; bracts ⅞–1 in. long, ovate-lanceolate, long-acuminate, pale green (often becoming whitish in age), with darker green raised nerves, reticulately veined between the nerves, more or less glandular-pubescent, ciliate on the margins with long white hairs; bracteoles ⅙–¼ in. long, linear-lanceolate, scarious, glandular-pubescent. Calyx scarious, ⅛ in. long, divided about ½-way down, minutely white-pubescent on both sides; lobes linear-lanceolate, very acute. Corolla pubescent outside, blue, 1¼ in. long; tube slightly enlarged and funnel-shaped for a short distance below the limb; lobes ⅕ in. long, obovate, rounded or truncate at the apex. Stamens slightly exserted beyond the corolla-tube; filaments glabrous. Ovary glabrous; style glabrous or nearly so. Capsules ½ in. long, clavate-oblong, pointed, glabrous. Seeds broadly ellipsoid, ⅛ in. long, densely hygroscopically hairy. Fl. B. I. v. 4, p. 420; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355; Watt, Dict. Econ. Prod. v. 3, p. 2. *Eranthemum pulchellum*, Roxb. Fl. Ind. v. 1, p. 111 (*not* of Andr.); Grah. Cat. p. 163. *Eranthemum nervosum*, Dalz. & Gibs. p. 195 (*not* of T. Anders.).—Flowers: Nov.–Jan. VERN. *Gulsham*.

KONKAN: *Stocks*!, *Dalzell*!, *Woodrow*; Matheran, *H. M. Birdwood*, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 1195! KANARA: Kâla naddi, *Ritchie*, 1195!—DISTRIB. India (Central India, Behar, W. Peninsula, Assam).

3. **Dædalacanthus montanus,** *T. Anders. in Thw. Enum.* (1860) p. 229, VAR. **concanensis,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4, p. 421. A leafy herb 2–3 ft. high. Leaves 2½–5 by 1–2 in., elliptic-lanceolate, acuminate, glabrous, base usually attenuated into the petiole, but sometimes rounded; main nerves 6–8 pairs, conspicuous beneath; petioles ½–1½ in. long. Flowers in interrupted spikes 1½–2 in. long forming a compound terminal panicle; rhachis of the spike quadrangular, viscous-hairy; bracts ⅛ by ⅛ in., ovate, obtusely acuminate, glandular-hairy, with a strong midnerve, the other nerves somewhat obscure; bracteoles ⅛ by 1/16 in., ovate, acute, glandular-hairy. Calyx green, ⅙–⅕ in. long, glandular-hairy, divided ½-way down; lobes lanceolate, acute. Corolla reaching 1¾ in. long, pale-blue; lobes ⅓ in. long, obovate-oblong, rounded at the apex. Filaments glabrous, 2 abortive ones between the other 2; anthers slightly exserted from the corolla-tube. Ovary glabrous; style pubescent. Capsules ⅝–¾ in. long or more,

clavate, pointed, much narrowed at the long solid base, with a few minute widely scattered hairs on the capsule and a ring of minute glandular hairs at its point. Seeds $\frac{1}{16}$ in. in diam. *Dædalacanthus concanensis* (sp.), T. Anders. MS. *Dædalacanthus montanus*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355 (*not* of T. Anders.). *Eranthemum montanum*, Dalz. & Gibs. p. 195.—Flowers: Oct.–Jan.

Rare. KONKAN: *Stocks!*, *Law!*, *Dalzell!* S. M. COUNTRY: Dharwar, *Dalzell & Gibson.*—DISTRIB. India (W. Peninsula).

Dædalacanthus nervosus, T. Anders. in Journ. Linn. Soc. v. 9 (1867) p. 487. A shrub 2–5 ft. high, a native of N. Bengal and Tirhut, commonly planted in gardens, sometimes found as an escape. It has white, concave, ovate, acuminate bracts with green nerves and veins and blue flowers in uninterrupted spikes often forming a terminal panicle.—Flowers: Nov.–Jan. Fl. B. I. v. 4, p. 418; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355 and Gard. in Ind. ed. 5, p. 415.

Dædalacanthus purpurascens, a common plant on the Ghâts, is often mistaken for *D. nervosus*.

17. **STROBILANTHES,** Blume.

Shrubs or herbs. Leaves opposite, often unequal, toothed or subentire, often lineolate with cystoliths. Flowers capitate or in strobilate or interrupted spikes, or paniculate, sessile or sometimes pedicellate; bracts and bracteoles large or small or 0, persistent or caducous. Calyx (in Bombay species) deeply and subequally 5-divided. Corolla straight or curved; tube usually ventricose above; lobes 5, ovate or rotund, subequal, twisted to the left in bud. Stamens (in Bombay species except *S. reticulatus*) 4, didynamous; anthers oblong, 2-celled, muticous. Disk small, or elongate as a stalk to the ovary. Ovary 2-celled; ovules 2 in each cell; style linear; stigma of one long linear branch, the other branch obsolete. Capsule 4- or 2-seeded. Seeds much compressed, glabrous or hairy; retinacula strong, curved; placentas in a few species separating elastically from the base, carrying the seeds with them.—DISTRIB. Mostly Asiatic; species nearly 200.

Stamens 2; pollen ellipsoid, longitudinally ribbed (Sect. *Endopogon*)	1. *S. reticulatus.*
Stamens 4; pollen ellipsoid, longitudinally ribbed (Sect. *Eustrobilanthes*).	
Flowers ebracteolate.	
Bracts hairy.	
Leaves sessile; bracts bristly with jointed hairs; corolla 1½ in. long	2. *S. sessilis*, var. *Ritchiei.*
Leaves petiolate; bracts softly glandular-hairy; corolla ¾–1 in. long	3. *S. lupulinus.*
Bracts glabrous.	
Corolla ½–¾ in. long; bracts white	4. *S. Heyneanus*
Corolla 1½ in. long; bracts green with a pink tinge	5. *S. callosus.*
Flowers bracteolate.	
Stems usually winged; bracteoles longer than the calyx.	6. *barbatus.*
Stems not winged; bracteoles shorter than the calyx.	
Bracts glabrous; peduncles long and slender, jointed and deflexed above the middle	7. *S. ciliatus.*

Bracts glandular-hairy.
Capsule 4-seeded.
Flowers in short subsessile spikes on the naked branches ..... 8. *S. scrobiculatus.*
Flowers in pedunculate axillary spikes.
Seeds glabrous ..... 9. *S. warreensis.*
Seeds hairy ..... 10. *S. asper.*
Capsule 2-seeded; petioles winged, the wings auricled at the base; spikes viscous-hairy, strong-smelling ..... 11. *S. perfoliatus.*
Stamens 4; pollen globose, echinate or tuberculate (Genus *Acanthopale*, C. B. Clarke); petioles not winged nor auricled; spikes viscidly pubescent; capsule usually 2-seeded; seeds hygroscopically hairy ..... 12. *S. ixiocephalus.*

1. **Strobilanthes reticulatus,** *Stapf, in Kew Bull.* (1894) p. 347. A small shrub; stem shortly strigose and subquadrangular in the upper part. Leaves up to 3 by 1½ in., ovate, acute, subentire, dark green, densely lineolate and with short stiff hairs on the upper surface, paler and strigose on the nerves and veins beneath, base rounded or subcordate; main nerves 6–8 pairs, prominent with conspicuous reticulate venation between; petioles ⅓ the length of the leaf-blade, often narrowly winged. Flowers in ovate shortly pedunculate spikes ¾ in. long, from the axils of the upper leaves; bracts reaching ½ in. long, ovate, glabrous or subglabrous outside, more or less villous inside; bracteoles 0. Calyx ⅓ in. long, deeply divided; tube $\frac{1}{10}$ in. long; segments linear-subulate, ciliate with long white hairs. Corolla 1 in. long; narrow part of tube shorter than the campanulately ventricose portion; lobes rotund-ovate. Stamens 2, included; filaments hairy; staminodes 2, minute, dentiform. Ovules 2 in each cell. Capsules not seen.—Flowers: Oct.

DECCAN: Mahableshwar in the jungle near Kate's Point, *Cooke!*
There is but one specimen in Herb. Kew., which was collected by me in October 1892. Further specimens from the locality would be desirable.

2. **Strobilanthes sessilis,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 85, VAR. **Ritchiei,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1884) p. 452. A small undershrub; stems 12–18 in. long, numerous, erect, quadrangular, usually hairy. Leaves sessile or nearly so, ¾–1¼ in. long, nearly as broad as long, ovate, acute, lineolate and hairy above, nearly glabrous except on the nerves (which are bristly) beneath, rounded or often cordate at the base. Flowers in strobiliform axillary and terminal pedunculate or subsessile spikes 1–3 in. long, often 3 together at the tops of the branches; peduncles of variable length, hairy; bracts ¼ in. long, ovate, long-acuminate, tinged with purple, bristly and ciliate with long, often jointed, hairs; bracteoles 0. Calyx divided to the base, ½ in. long; sepals lanceolate, densely ciliate, subequal. Corolla purple, 1¼ in. long, hairy outside, slightly hairy inside, but densely so at the insertion of the stamens; cylindric part of the tube shorter than the campanulately ventricose upper portion; lobes ovate. Stamens included; longer filaments clothed with long hairs to the top, the shorter glabrous above their insertion or rarely with 2 or 3 hairs. Style hairy, slightly swollen below the stigma. Capsules ⅜ in. long, linear-oblong, acute, glabrous or with a few minute glandular hairs at the tip. Seeds $\frac{1}{10}$ in. in diam., suborbicular, hygroscopically hairy all over, brown. Talb. Trees, Bomb. ed. 2, p. 263. *Strobilanthes sessiloides,* Dalz. & Gibs.

Bo. Fl. p. 187 (*not* of Wight). *S. sessilis* var. *sessiloides*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356 (*not* of C. B. Clarke).—Flowers: Sept.–Oct., once in about 7 years (*Talbot*).

Mr. Talbot (*l. c.*) says that a general flowering took place near the Rámghát in Sept. 1889. Separate flowering clumps are, he says, found in Sept. and Oct. of years other than those of general flowering.—VERN. *Bukra*.

KONKAN: Amboli Ghát, *Kanitkar*! DECCAN: Phunda Ghát, abundant, *Dalzell & Gibson*. S. M. COUNTRY: Párvá Ghát, *Ritchie*, 1207!; Rámghát, *Talbot*. KANARA: common in the Supa, Sirsi and Siddapur talukas of N. Kanara, *Talbot*!—DISTRIB. India (W. Peninsula), apparently endemic.

3. **Strobilanthes lupulinus,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 85. An erect shrub; stems and branches woody, the older glabrous and warted, the younger hairy. Leaves 4½–6 by 2½–3½ in., broadly elliptic, acuminate, crenate-serrate, densely lineolate, usually rough above with stiff short hairs, base cuneate; main nerves about 8 pairs, prominent; petioles 1–1¾ in. long. Flowers in axillary and terminal simple or umbellately branched spikes 1½ in. long; bracts ⅝ in. long, elliptic-obovate, rounded at the apex, narrowed at the base, glandular-hairy, veined, concave; bracteoles 0. Calyx ⅓ in. long, divided nearly to the base; segments linear-oblong, obtuse, scarious, hairy at the tip. Corolla ¾–1 in. long, straight, glabrous outside, hairy inside; tube very narrow at the base, gradually and slightly enlarged upwards. Filaments of the longer stamens hairy. Ovary glabrous; style glabrous or nearly so. Capsules ⅜ in. long, oblong-clavate, 4-seeded, glabrous. Seeds ⅛ in. long, broadly elliptic or suborbicular, very thin, flat, glabrous, yellowish. Fl. B. I. v. 4, p. 443; Talb. Trees, Bomb. ed. 2, p. 261; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355.—Flowers: Oct.–Jan.

Rare. KONKAN: *Stocks*!, *Dalzell*! S. M. COUNTRY: Rámghát, *Ritchie*, 1939!, *Woodrow*. KANARA: moist forests at Yellapur, *Talbot*.—DISTRIB. India (W. Peninsula), apparently endemic.

4. **Strobilanthes Heyneanus,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 85. A small shrub; stems hirsute upwards. Leaves drying green, 3–6 by 1¼–2¾ in., acuminate, closely crenate-serrate, hairy above with short stiff bulbous-based hairs, softly hairy on the nerves beneath, lineolate on both surfaces (very strongly so on the upper), base tapering (sometimes rounded in the upper leaves); main nerves about 7 pairs; petioles 1–2½ in. long. Flowers in axillary simple or branched glabrous spikes; peduncles usually short; bracts rather more than ½ in. long by ⅜ in. wide, white, membranous, broadly elliptic, rounded at the apex, glabrous, finely reticulately veined, very concave; bracteoles 0. Calyx ⅓ in. long, divided nearly to the base, glabrous; segments subequal, linear-lanceolate, obtuse. Corolla ½–¾ in. long, pale-blue, the narrow portion of the tube much shorter than the ventricose. Filaments of the longer stamens bearded. Ovary glabrous; style slightly pubescent. Capsules ⅓ in. long, oblong, subacute, 4-seeded. Seeds ovoid, flattened, glabrous, ⅛ in. long. Fl. B. I. v. 4, p. 443; Dalz. & Gibs. p. 187; Talb. Trees, Bomb. ed. 2, p. 261; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Strobilanthes rugosus*, Wight, Icon. t. 1619.—Flowers: Oct.–Dec., apparently annually (*Talbot*). VERN. *A'kra*; *Itari*.

Konkan: *Law*!. *Stocks*!; Matheran, *Cooke*! S. M. Country: Rámghát, *Ritchie*, $\frac{5\,8\,8}{2}$!; Chorla Ghát, *Dalzell*!; Castlerock, *Cooke*!, *Bhiva*!, *Woodrow*. Kanara: common in the evergreen forests between the Nilkund and Gairsoppa Ghâts, *Talbot*. —Distrib. India (W. Peninsula), apparently endemic.

5. **Strobilanthes callosus,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 85. A shrub 6–20 ft. high; stems rigid, rough and warted, glabrate. Leaves 4–9 by 1½–3 in., one of each pair often smaller than the opposite one, elliptic-lanceolate, acute or acuminate, the margins crenate and ciliate (the crenatures sometimes with a blunt tooth), strongly lineolate on the upper surface with cystoliths (which in dried specimens are usually stellately arranged with a stiff short bristle above the centre of each cluster), dark green above, paler and more or less hairy on the nerves beneath, base tapering wing-like into the petiole; main nerves 10–14 pairs, slender, prominent; petioles variable in length, sometimes reaching (in the large leaves) 3 in. long. Flowers axillary, in simple or branched ovoid, pedunculate, subtetragonal spikes with rounded edges, 1–3½ in. long; peduncles often with one or two pairs of orbicular sessile bracts below the spike; bracts ½–¾ in. long, often as broad as long, broadly elliptic or obovate, rounded at the apex, concave, glabrous, covered with a viscous secretion with a balsamic but not agreeable odor, green with a pink tinge; bracteoles 0. Disk bright orange. Calyx ½ in. long in flower, much enlarged in fruit, divided nearly to the base; segments leathery, elliptic-lanceolate, ⅙–⅕ in. broad, obtuse, slightly penicillate at the apex, softly pubescent, nerved. Corolla 1½ in. long or more, with a white tube and purple limb, glabrous outside, with yellow hairs in the mouth inside; cylindric base of the tube narrow, shorter than the ventricose portion; lobes ½ in. long, rounded, much crumpled in æstivation. Filaments of the longer stamens bearded. Capsules ¾ by ¼ in., obovoid, acute, apiculate, narrow at the base, 2-seeded. Seeds ½ by ⅜ in., broadly ovate, acute, densely clothed (except the oblong nucleus) with white appressed hairs. Fl. B. I. v. 4, p. 451; Dalz. & Gibs. p. 188; Talb. Trees, Bomb. ed. 2, p. 262; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356. *Strobilanthes Grahamianus,* Wight, Icon. t. 1520; Dalz. & Gibs. p. 187. *S. ciliata*?, Grah. Cat. p. 162 (not *S. ciliatus* of Nees).—Flowers: Sept.–Nov., at intervals of 7 or 8 (many natives say 10) years. Mr. Talbot says that a general flowering took place in N. Kanara in 1887. Vern. *Kárvi.*

Very common on the Ghâts. Covers large areas on the Konkan and N. Kanara Ghâts, forming the undergrowth in many deciduous moist forests (*Talbot*). The stems which, if kept regularly cut down, grow to the thickness of a walking-stick, are used by the natives for making mud walls, the stems being placed close together and covered with a plaster of mud and cowdung. Konkan: *Stocks*!, *Law*!; Matheran, below Chowk Point, *H. M. Birdwood.* Deccan: Purandhar, *A. G. Cane*!; Mahableshwar, *Cooke*! Kanara: Anmod (N. Kanara), *Talbot*, 1616!—Distrib. India (W. Peninsula, Central India).

6. **Strobilanthes barbatus,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 85. A large shrub 8–12 ft. high, subscandent (*Dalzell*), with numerous exposed roots from the lower part of the stem (*Beddome*); stems and branches quadrangular, often broadly winged (sometimes wingless). Leaves coriaceous, 4–10 by 2–4 in., elliptic-lanceolate, acuminate, crenulate or subentire, glabrous, shining above, densely

lineolate especially on the upper side, base tapering, often running down wing-like into the petiole; main nerves 7–9 pairs, conspicuous on both sides; petioles about 1 in. long, frequently obscure owing to the decurrence of the leaf-blade, often winged, the wings sometimes running into the wings on the stem or branch. Flowers in axillary and terminal dense heads or spikes 1–2 in. long; bracts $\frac{3}{4}$ in. long, densely imbricate, rhomboid-cuneate, cuspidately mucronate, ciliate and, as well as the bracteoles, becoming viscous-hairy in fruit (*Talbot*); bracteoles $\frac{1}{2}$–$\frac{5}{8}$ in. long, lanceolate, cuspidate, ciliate. Calyx $\frac{1}{3}$ in. long, divided more than $\frac{1}{2}$-way down; segments lanceolate, acuminate, ciliate. Corolla white, $\frac{7}{8}$ in. long, hairy inside, often with a few scattered hairs on the outside of the limb; lower half of the tube narrow-cylindric, the upper portion suddenly campanulately enlarged; lobes $\frac{1}{4}$ in. long, oblong, obtuse, ciliate. Stamens 4, exserted; longer filaments bearded, the shorter hairy at the base only; rudimentary 5th stamen sometimes present. Style glabrous. Capsules $\frac{1}{2}$–$\frac{2}{3}$ in. long, clavate, glabrous, 2-seeded. Seeds $\frac{1}{4}$ in. long, broadly elliptic, subacute at the apex, very thin, yellow, without areoles, glabrous. Fl. B. I. v. 4, p. 437; Bedd. Icon. Pl. Ind. Or. p. 49, t. 212; Talb. Trees, Bomb. ed. 2, p. 261; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Strobilanthes tetrapterus*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 342; Dalz. & Gibs. p. 187.—Flowers: Oct.–Dec., septennially (*Beddome*, *Talbot*).

KONKAN: *Stocks!*, *Hooker!*; Wari country, *Dalzell!* KANARA: *Bhiva!*; common in the Yellapur taluka, *Talbot*; Mulas, *Ritchie*, 1938!—DISTRIB. India (W. Peninsula).

7. **Strobilanthes ciliatus,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 85. A small shrub; stems and branches terete or subquadrangular, often fimbriate at the nodes. Leaves 4–7 by 1–2 in., lanceolate, acuminate, lineolate (densely so above), glabrous or nearly so, serrate, base attenuated into the petiole; main nerves 6–7 pairs; petioles $\frac{1}{2}$–$1\frac{1}{2}$ in. long, sometimes obscure. Flowers in axillary slender glabrous spikes 1–3 in. long; peduncles long, slender, glabrous, jointed and bracteate below the middle and there deflexed; bracts $\frac{1}{4}$ in. long, ovate, subacute, glabrous, lineolate, the margins often obscurely toothed; bracteoles $\frac{1}{6}$ in. long, shorter than the calyx, linear, subobtuse, mucronulate, lineolate, glabrous. Calyx $\frac{1}{4}$ in. long, glabrous or nearly so; tube about $\frac{1}{10}$ in. long; segments subequal, linear, subobtuse. Corolla white, $\frac{1}{2}$–$\frac{5}{8}$ in. long; tube narrow in the lower part, campanulately swollen in the upper half; lobes $\frac{1}{8}$ in. long, oblong, rounded at the apex, spotted with lilac at the base (*Beddome*). Stamens 4, exserted; filaments of the longer stamens bearded; anthers purple. Ovary glabrous; style glabrous. Capsules not seen. Fl. B. I. v. 4, p. 439; Bedd. Icon. Pl. Ind. Or. p. 49, t. 211; Talb. Trees, Bomb. ed. 2, p. 261; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355; Watt, Dict. Econ. Prod. v. 6, part 3, p. 375.—Flowers: Oct.–Nov., probably annually (*Beddome*).

KONKAN: *Stocks!*, *Dalzell!*; Savantvádi, *Cooke!*, *Woodrow.* KANARA: evergreen forests of the Yellapur taluka of N. Kanara, *Talbot.*—DISTRIB. India (W. Peninsula), apparently endemic.

The plant has a strong aromatic odor, and is used medicinally by the natives in the regions where it grows (*Watt*).

8. **Strobilanthes scrobiculatus,** *Dalz. ex C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1884) p. 445. A small branched shrub; older

branches glabrous, terete, ashy-white. Leaves 2–3 by ¾–1 in., almost all falling off before flowering-time except a few at the tops of the branches, elliptic-lanceolate, acuminate, densely lineolate, especially on the upper side, otherwise nearly glabrous; base tapering, unequal-sided; main nerves 6–7 pairs; petioles ½ in. long. Flowers in numerous subsessile spikes, elongating in fruit, on the naked branches from the axils of fallen leaves; bracts ⅛ in. long, obovate-oblong, hairy with gland-tipped hairs; bracteoles ⅛ in. long, linear, obtuse, glandular-hairy. Calyx ⅓ in. long in flower (enlarged to ⅝ in. in fruit), glandular-hairy; tube $\frac{1}{16}$ in. long; segments linear, subobtuse, densely glandular-ciliate. Corolla 1 in. long with whitish tube and limb of a beautiful blue, glabrous outside, hairy inside; lower contracted part of the tube much shorter than the narrowly ventricose portion; lobes ⅛–$\frac{1}{16}$ in. long, oblong, rounded or truncate and with slightly crenulate margins. Stamens 4, included; filaments glabrous; anthers apiculate, obtuse at the base. Capsules rather less than ½ in. long, lanceolate, acute, 4-seeded. Seeds $\frac{1}{10}$–⅛ in. long, ovoid, subacute, hygroscopically hairy and with a dense fringe on the margin, which is drawn into a point at the apex, giving the dry seed the appearance of having a long slender acumen. Talb. Trees, Bomb. ed. 2, p. 262.—Flowers: Nov., with intervals of some years.

West coast of Peninsula, *Dalzell!* Deccan: Mahableshwar, *Ralph!*, *Cooke!* Kanara: common on the summit of Dursingudda in the Supa taluka of N. Kanara, 3400 ft. elevation, *Talbot.*—Distrib. India (W. Peninsula), apparently endemic.

A very beautiful species when in full flower. It is very common, occupying extensive patches in some of the ravines at Mahableshwar, but I have only seen it in flower once (in 1888), when the sides of the ravines where it grew appeared, from a short distance, to be quite a sheet of blue. The leaves of the branches fall before the plant flowers, only a few small ones remaining at the tips. The measurements of leaves given above only apply to these latter, and do not represent the size of the actual stem-leaves.

9. **Strobilanthes warreensis,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 341. Shrubby, erect, 5–6 ft. high; stem obtusely quadrangular or subterete. Leaves 4½–6 by 1½–2 in., lanceolate, long-acuminate, crenate or subserrate, glabrous, densely lineolate above, base tapering and decurrent into the petiole; main nerves 7 pairs, conspicuous on both sides; petioles ½–1¼ in. long, often indistinct owing to the decurrent leaf-blade. Flowers in axillary pedunculate spikes 1–3 in. long; peduncles hairy; bracts (in flower) ¼–⅓ in. long, elliptic-oblong, concave, densely clothed, as are the bracteoles and calyx, with gland-tipped hairs; bracteoles ¼ in. long, shorter than the calyx, linear, obtuse. Calyx much enlarged in fruit, in flower ⅓ in. long, divided nearly to the base; segments linear, subacute, one of them a little longer than the other 4. Corolla ⅜–½ in. long, white, glabrous outside and with a few hairs inside; tube narrowly cylindric in the lower, campanulately inflated in the upper half; lobes ⅛ in. long, oblong, rounded at the apex, spotted with purple at the base. Stamens 4, exserted; filaments of the longer stamens bearded. Ovary glabrous; style glabrous. Capsules ½–¾ in. long, oblong, subacute, minutely pubescent, 4-seeded. Seeds elliptic-oblong, rounded at the apex, glabrous, flat, striate, yellow. Fl. B. I. v. 4, p. 439; Dalz. & Gibs. p. 187; Talb. Trees, Bomb. ed. 2, p. 261; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 355. *Strobilanthes*

parviflorus, Bedd. Icon. Pl. Ind. Or. (1874) p. 45, t. 197.—Flowers: Oct.–Dec.

KONKAN: Wari country, *Dalzell*! KANARA: Mulas, *Ritchie*, 1937!; Nilkund Ghát, *Talbot*, *Woodrow*.—DISTRIB. India (W. Peninsula), apparently endemic.

10. **Strobilanthes asper,** *Wight, Icon.* (1850) t. 1518 (*not of* Dcne.). A shrub 2–4 ft. high; stems with swollen nodes, the young ones obtusely subquadrangular, glandular-hairy. Leaves 2½–5 by 1¼–2¼ in., elliptic, acuminate, crenate, dark green, densely lineolate and rough with short stiff hairs above, paler and hairy on the nerves and veins beneath, base tapering or shortly cuneate; main nerves 6–8 pairs; petioles ¾–1¾ in. long. Flowers in solitary or branched (often ternately) pedunculate oblong spikes 1–1½ in. long in flower (elongating to 2 to 3 in. in fruit); peduncles glandular-hairy; bracts ⅛ by ⅕ in., glandular hairy, irregularly ovate, obliquely and bluntly acuminate and with ciliate often curled margins; bracteoles shorter than the calyx, ⅕ in. long, linear, obtuse, ciliate. Calyx ⅓ in. long; segments linear, subobtuse, hairy and ciliate. Corolla ⅝–¾ in. long, glabrous or nearly so outside, hairy inside, densely so below the stamens, the narrow cylindric basal rather shorter than the ventricose portion; lobes short, rounded, sometimes slightly crenulate. Filaments of the longer stamens slightly hairy. Ovary glabrous; style pubescent. Capsules ½ in. long, oblong, acute, 4-seeded. Seeds ⅛ in. long, ovate, flat, hygroscopically hairy. Fl. B. I. v. 4, p. 452; Talb. Trees, Bomb. ed. 2, p. 263; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Aug.–Oct.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks*!; Matheran, near little Chowk Point, *H. M. Birdwood*. KANARA: Santaveri, *Woodrow*.—DISTRIB. India (W. Peninsula).

11. **Strobilanthes perfoliatus,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 471. A much-branched shrub 3–4 ft. high, nearly glabrous except the inflorescence; stems terete. Leaves 4–8 by 1¼–2½ in. (sometimes, in exceptional cases, attaining 15 in. in length), elliptic-lanceolate, much-acuminate, sparingly toothed or entire, green lineolate and glabrous above, steel-grey beneath, base tapering, decurrent into the petiole, forming a wing along it to its lower insertion and there auriculate (not perfoliate); main nerves 6–10 pairs. Flowers in axillary and terminal simple or compound strong-smelling spikes 2–5 in. long, close together along the rhachis or often with internodes of variable length; rhachis tetragonal, viscous-hairy; peduncles usually short; bracts ⅝–¾ by $\frac{1}{10}$–⅛ in., linear-lanceolate, subacute and, as well as the bracteoles and calyx, glandular-hairy; bracteoles ⅜ in. long, shorter than the calyx, linear, subacute. Calyx ½ in. long, divided nearly to the base; segments linear, subacute, one longer than the other 4, which are somewhat unequal. Corolla blue, glabrous outside, hairy inside, 1½ in. long or more, tubular-infundibuliform; narrow portion of the tube shorter than the ventricose; lobes ⅓ in. long, equal, rounded. Stamens 4, included; filaments of the longer stamens bearded with long hairs almost to the apex (not glabrous, as erroneously stated in Fl. B. I.). Style slightly hairy. Capsules ½ by ⅕ in., obovoid, compressed, mucronate, glabrous, 2-seeded. Seeds ⅙ in. long, ovoid, shaggy; areoles small. Fl. B. I. v. 4, p. 458; Talb. Trees, Bomb. ed. 2, p. 263; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.

Leptacanthus alatus, Wight, Icon. t. 1527. *Endopogon integrifolius*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 342; Dalz. & Gibs. p. 185.—Flowers: Dec.–Mar. [about once in 7 years (*Talbot*); triennially (*H. M. Birdwood*, Cat. Fl. Matheran & Mahableshwar, p. 25)]. Mr. Talbot (*l. c.*) says that a general flowering took place near Ainshi (N. Kanara) in 1887. VERN. *Waiti.*

KONKAN: *Stocks*!, *Law*!; in old forests in all the elevated parts of the Konkan, *Dalzell*!; Matheran, *Cooke*!, *H. M. Birdwood*; hills near Panvel, *Dalzell & Gibson.* KANARA: evergreen forests from Ainshi southwards, gregarious, *Talbot*; Kadgal, *Woodrow.*—DISTRIB. India (W. Peninsula), apparently endemic.

12. **Strobilanthes ixiocephalus,** *Benth. in Flora*, v. 33 (1849) p. 557. A small straggling shrub; branches terete, the older glabrous. Leaves 2½–7 by 1¼–2½ in., one of each pair usually smaller than the other, elliptic-lanceolate, acuminate, crenate, densely lineolate on both sides, the upper side and the nerves beneath rough with short stiff hairs, base cuneate, often unequal-sided; main nerves 8–10 pairs, slender, prominent; petioles ¾–2 in. long. Flowers in pedunculate ovoid viscid spikes ½–1½ in. long, with a balsamic odor, solitary and axillary, or in branched (often ternate) cymes which are axillary or terminally clustered; bracts ½ by ¼–⅓ in., ovate, usually bluntly acuminate, viscous-hairy; bracteoles ¼–⅓ in. long, linear-spathulate, viscous-hairy. Calyx ⅜–½ in. long, enlarged in fruit, divided almost to the base, viscous-hairy; segments linear, obtuse. Corolla white, ¾–1¼ in. long, slightly pubescent outside, hairy inside; narrow portion of the tube about equalling the ventricose portion; lobes ¼ in. long, ovate-oblong. Stamens included, hairy at the base, the longer filaments slightly hairy upwards; pollen globose, echinate or tuberculate. Style faintly pubescent. Capsules ½ in. long, obovoid, narrowed at the base, compressed, mucronate, usually 2-seeded, glabrous. Seeds ⅛ in. long, ovoid, subacute, flattened, hygroscopically hairy, very densely so on the margin. Fl. B. I. v. 4, p. 444; Bedd. Icon. Pl. Ind. Or. p. 47, t. 203; Talb. Trees, Bomb. ed. 2, p. 262; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356. *Strobilanthes Neesiana*, Wight, Icon. t. 1523; Dalz. & Gibs. p. 188. *S. glutinosa*, Grah. Cat. Bo. Pl. p. 162 (*not* of Nees).—Flowers: Nov.–Jan., septennially (*H. M. Birdwood*) or annually (*Talbot*). It flowered abundantly at Mahableshwar in November 1896 (*H. M. Birdwood*, Cat. Fl. Matheran & Mahableshwar, p. 24). VERN. *Dármori*; *Kárva.*

KONKAN: *Stocks*!, *Law*!; Salsette and Konkan hills, *Dalzell & Gibson*; Vingorla, *Kanitkar*! DECCAN: Panchgani, *Woodrow*!; Mahableshwar (near the lake), *Cooke*! S. M. COUNTRY: Rámghát, *Dalzell*! KANARA: common in N. Kanara from the coast inland in both evergreen and deciduous forests, often on laterite, *Talbot*; Supa and Kála naddi, *Ritchie*, 1216!; Kumbarváda, *Talbot*, 1829!—DISTRIB. India (W. Peninsula), apparently endemic.

SPECIES NOT SEEN.

STROBILANTHES MINOR, Talb. Trees, Shrubs, Bomb. ed. 2 (1902) p. 262. A small shrub 1–2 ft. high. Leaves small, ovate, bluntly acuminate, 1½–3 by ¾–1¾ in., petioles ¼–1 in. long. Flowers ½ in. long, in dense small subglobose heads; bracts green, ovate, ciliate, ¼ in. across; bracteoles ciliate. Corolla blue, very hairy within. Stamens 4; filaments hairy downwards. Style hairy. Banks of the Kála naddi near Supa, N. Kanara.

STROBILANTHES MEMBRANACEUS, Talb. Trees, Shrubs, Bomb. ed. 2 (1902) p. 261. A stout gregarious shrub. Leaves broadly ovate, long-acuminate, narrowed into the petiole, deeply crenate-serrate, membranous, rugose, hispidulous, 2–7 by 1–4 in.; petiole ½–3 in. long. Heads ovoid, 1–1½ in. long, densely viscous-hairy; hairs mostly jointed. Seeds ⅛ in., exareolate, quite glabrous.

Distinguished from other Bombay species of *Strobilanthes* by its rugose hispidulous softly membranous leaves. Common in the jungles near the Tinai Ghát, N. Kanara (*Talbot*).

18. **CALACANTHUS,** T. Anders.

An erect shrub, glabrous except the inflorescence. Leaves large, entire. Flowers large, solitary and sessile in the axils of bracts, arranged in long lax spikes terminal and from the upper axils; bracts and bracteoles herbaceous. Calyx sub-5-partite; segments unequal, the upper and two lower lanceolate, the two lateral innermost, linear. Corolla purple, deeply 2-lipped; upper lip narrow, shortly 2-fid; lower lip large, convex, shortly 3-fid; lobes contorted in bud. Stamens 4, didynamous, inserted above the middle of the tube; filaments connate at the base, in pairs connected by a transverse line or membrane; anthers subequal, oblong, 2-celled, ciliate. Disk not prominent. Ovary 2-celled; ovules 2 in each cell; style long, filiform, hairy; stigma simple, linear. Capsule obovoid, compressed, acute at both ends, 2-seeded. Seeds compressed, hairy, supported on retinacula.—DISTRIB. Western Peninsula of India; species 1.

1. **Calacanthus Dalzelliana,** *T. Anders. ex Benth. & Hook. f. Gen. Pl.* v. 2 (1876) p. 1088. A leafy gregarious shrub 5–6 ft. high, black when dry; stem erect, quadrangular, glabrous, except for a few hairs at the nodes. Leaves 5–8 by 2–3½ in., the upper subsessile, the lower petiolate, elliptic, acuminate, entire, slightly ciliate, glabrous or nearly so, minutely lineolate on both surfaces, base tapering; main nerves 10–12 pairs, arcuate, prominent; petioles 0–1½ in. long. Spikes of flowers terminal and from the upper axils, 1–6 in. long, simple or branched; bracts ¾–1¼ by ⅛ in., elliptic-lanceolate, penninerved, and, as well as the bracteoles and calyx-segments, hirsute and densely ciliate with long white hairs; bracteoles ¾ by ⅛ in., oblong-lanceolate. Calyx ¾ in. to top of longest segment, divided nearly to the base, the longest segment ⅛–⅕ in. wide, lanceolate, 5-nerved, 2 other segments narrower, lanceolate, 3-nerved, the 2 lateral segments linear-subulate, shorter than the others. Corolla bluish-purple, 1½ in. long or more, hairy outside; upper lip 2-fid; lower lip 3-lobed, convex, transversely plicate and with 2 rows of bright yellow hairs down its centre; narrow portion of tube short. Stamens 4, didynamous; filaments glabrous; anthers ciliate, subsagittate at the base. Ovary and style hairy. Capsules ¾–⅞ by ⅓ in., obovoid, compressed, narrowed at the base and acute at the apex, pubescent. Seeds ⅓ in. in diam., hairy, yellowish. Fl. B. I. v. 4, p. 478; Talb. Trees, Bomb. ed. 2, p. 264; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356. *Lepidagathis grandiflora*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 138; Dalz. & Gibs. p. 190; Bedd. Icon. Pl. Ind. Or. p. 54, t. 226.—Flowers: Oct.–Dec.

KONKAN: Ghâts, *Dalzell*!; Matheran (just before reaching the summit below the Chauki), *Cooke*!, *Woodrow*. S. M. COUNTRY: Párvá Ghát, *Ritchie*, 1201! KANARA: Supa Ghâts of N. Kanara, *Talbot*.—DISTRIB. India (W. Peninsula), apparently endemic.

19. **ANDROGRAPHIS,** Wall.

Annual erect or procumbent herbs or small shrubs. Leaves entire. Flowers in lax panicles, or dense and subcapitate axillary and terminal racemes often unilateral; bracts small; bracteoles minute or 0. Calyx 5-partite; segments narrow. Corolla small, tubular, 2-lipped, pubescent. Stamens 2; filaments ciliate or setulose; anthers 2-celled, exserted, the cells oblong, parallel, subequal, muticous, bearded at the base. Ovary 2-celled; ovules 3–6 in each cell; style slender; stigma shortly 2-lobed. Capsule linear-oblong or elliptic, compressed contrary to the septum. Seeds hard, subquadrate or oblong, rugosely pitted, glabrous; retinacula lanceolate.—DISTRIB. India, Ceylon; species 17.

Leaves acute, glabrous; racemes laxly panicled; capsule glabrous	1. *A. paniculata.*
Leaves obtuse, hairy; racemes axillary, not panicled; capsule hairy	2. *A. echioides.*

1. **Andrographis paniculata,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 116. An erect branched annual 1–3 ft. high; branches sharply quadrangular, often narrowly winged in the upper part. Leaves 2–3 by $\frac{1}{2}$–1 in., lanceolate, acute, glabrous, slightly undulate, pale beneath; base tapering; main nerves 4–6 pairs, slender; petioles 0–$\frac{1}{4}$ in. long. Flowers small, solitary, distant, in lax spreading axillary and terminal racemes or panicles, the whole forming a large pyramidal paniculate inflorescence; bracts $\frac{1}{10}$ in. long, lanceolate; bracteoles similar or 0; pedicels $\frac{1}{30}$–$\frac{1}{6}$ in. long, glandular-pubescent. Calyx $\frac{1}{8}$ in. long; sepals equal, linear-lanceolate, glandular-pubescent. Corolla rose-colored, $\frac{3}{8}$ in. long, hairy outside, 2-lipped rather more than $\frac{1}{2}$-way down; tube $\frac{1}{5}$ in. long, slightly enlarged below the limb; upper lip $\frac{1}{6}$ in. long, oblong, 2-toothed at the apex; lower lip equal in length, deeply 3-lobed, the lobes $\frac{1}{10}$ in. long, linear-oblong, subobtuse. Filaments flattened, hairy in the upper part; anthers bearded at the base. Ovary glabrous; style slightly pubescent. Capsules $\frac{3}{4}$ by $\frac{1}{8}$ in., linear-oblong, acute at both ends. Seeds numerous, subquadrate, osseous, rugosely pitted, glabrous, yellowish-brown. Fl. B. I. v. 4, p. 501; Dalz. & Gibs. p. 198; Wight, Icon. t. 518; Trim. Fl. Ceyl. v. 3, p. 326; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357; Watt, Dict. Econ. Prod. v. 1, p. 240. *Justicia paniculata*, Burm. Fl. Ind. p. 9; Grah. Cat. p. 164.—Flowers: Dec. VERN. *Kreát*; *Kalpa*; *Kála-meti*; *Mahátiti.*

KONKAN: *Stocks*!; Sewri, *Woodrow*!; Island of Bombay, *Kanitkar*! KANARA: Honavar, *Woodrow.*—DISTRIB. Throughout India, sometimes cultivated; Ceylon.

The plant is famous as a bitter tonic and febrifuge and is sold in the Indian markets. The broken stems and leaves are infused in cold water and the bitter infusion taken. See Watt, Dict. Econ. Prod. l. c.

2. **Andrographis echioides,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 117. Herbaceous, erect, 6–18 in. high; stem quadrangular, grooved, with a few spreading branches from near the base often not branched, clothed with spreading hairs. Leaves 1$\frac{1}{4}$–3 by $\frac{3}{8}$–1 in., sessile, oblong, obtuse, more or less sparsely hairy, ciliate on the margins, base cuneate; main nerves 4–6 pairs. Flowers numerous, placed along the upper side of a slender glandular-hairy rhachis, in axillary racemes shorter than the leaves; bracts $\frac{1}{12}$ in. long, lanceolate; bracteoles minute, $\frac{1}{30}$ in. long, subulate. Calyx $\frac{1}{6}$–$\frac{1}{4}$ in. long, glandular-hairy,

divided almost to the base; sepals narrowly linear (scarcely $\frac{1}{30}$ in. wide), acute, ciliate, elongating in fruit. Corolla densely pubescent outside, pink or white, $\frac{3}{8}$–$\frac{5}{8}$ in. long, 2-lipped a little less than $\frac{1}{2}$-way down; upper lip obovate-oblong, rounded; lower lip 3-lobed about $\frac{1}{2}$-way, blotched with purple, the lobes oblong, obtuse, the middle lobe slightly larger than the lateral ones. Filaments flat, sparsely hairy; anthers bearded. Ovary hairy; style pubescent. Capsules $\frac{3}{8}$–$\frac{1}{2}$ in. long, half as broad as long, elliptic-lanceolate (in horizontal section), compressed, acute at both ends, hairy. Seeds $\frac{1}{10}$ by $\frac{1}{20}$ in., oblong, not compressed, rugosely pitted, glabrous. Fl. B. I. v. 4, p. 505; Dalz. & Gibs. p. 198; Trim. Fl. Ceyl. v. 3, p. 327; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Justicia echioides*, Linn. Sp. Pl. (1753) p. 16; Grah. Cat. p. 164.—Flowers: Aug.–Sept.

DECCAN: sides of ravines, not very common, *Dalzell & Gibson*; S. of Ahmednagar, rare, *Gibson* ex *Graham*; Hotgi, *Bhiva*!; Mahableshwar, *Cooke*!; Poona, banks of the Mula river, *Woodrow*! S. M. COUNTRY: Badami, *Woodrow*! GUJARAT: *Stocks*!; Karnáli, *Kanitkar*!—DISTRIB. Tropical India in the drier districts; Ceylon.

20. **HAPLANTHUS,** Nees.

Erect herbs. Leaves entire. Flowers axillary, pseudo-verticillate, surrounded by numerous abortive branchlets reduced to spine-like cladodes terminated by 2–3 minute spinous or subspinous points (reduced leaves); bracts and bracteoles small. Calyx 5-partite; segments linear lanceolate, subequal. Corolla small, tubular; tube slightly enlarged above; limb 2-lipped, the upper lip 2-fid, the lower obtusely 3-lobed. Stamens 2, shorter than the corolla, inserted below the throat; filaments flattened; anthers connivent, subcoherent, 2-celled, dorsifixed, the cells ovate, more or less unequal, muticous, one usually bearded on the back. Disk thick, prominent. Ovary 2-celled; ovules 3–8 in each cell; style acute or obliquely truncate at the apex [redacted] linear-oblong, compressed contrary to the septum, 6–16-seeded [redacted] the base. Seeds oblong-ellipsoid, slightly or not compressed, densely sl[redacted] hairy when wetted.—DISTRIB. Species 3, endemic in India.

Bracteoles longer than the calyx; axillary spines exceeding 1 in. long; capsule glabrous	1. *H. verticillaris.*
Bracteoles shorter than the calyx; axillary spines not exceeding 1 in. long; capsule pubescent	2. *H. tentaculatus.*

1. **Haplanthus verticillaris,** *Nees, in DC. Prodr.* v. 11 (1847) p. 513. Herbaceous, 1½–2½ ft. high; stem glabrous at the base, more or less pubescent upwards. Leaves 2½–4 by 1½–2 in., ovate, acuminate, or acute, or subobtuse, pubescent above and on the nerves beneath; base shortly cuneate; main nerves 8–10 pairs, slender, prominent beneath; petioles 1–2 in. long. Axillary spines (*cladodes*) 1–1½ in. long, quadrangular, usually with 2 sharp naked spinous teeth at the apex, clothed with short glandular and long spreading hairs or sometimes nearly glabrous. Flowers in the midst of the spines, sessile; bracteoles subulate, finely pointed, longer than the calyx. Calyx ⅛ in. long, divided almost to the base; sepals glandular-pubescent, lanceolate with a subulate point. Corolla $\frac{5}{8}$ *in.* long, slightly pubescent outside, tubular, 2-lipped about ¼-way down; limb dark-lilac, marked with darker lines, greenish-white inside the throat. Capsules $\frac{3}{8}$–$\frac{1}{2}$ in. long, narrowly

oblong, acute, grooved, glabrous, white. Seeds $\frac{1}{10}$–$\frac{1}{8}$ by $\frac{1}{20}$ in., oblong, compressed, yellowish-brown, densely hairy when wetted. Fl. B. I. v. 4, p. 506; Dalz. & Gibs. p. 197; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Justicia verticillata*, Roxb. Fl. Ind. v. 1, p. 135; Grah. Cat. p. 165.—Flowers: Dec. VERN. *Jakára*; *Kaṭeri*.

Dalzell, without locality in Herb. Kew.! KONKAN: *Law*!; Konkan hills, *Woodrow*, 20!; Matheran, *Cooke*! DECCAN: Khandala, *Cooke*!, *Graham*; Mahableshwar, *Cooke*!; Sinhagad, *Gangaram*! S. M. COUNTRY: near Belgaum, *Ritchie*, 577!—DISTRIB. India (W. Peninsula).

2. **Haplanthus tentaculatus,** *Nees, in DC. Prodr.* v. 11 (1847) p. 513. A slender herb; stems quadrangular in the upper part, glandular-pubescent throughout. Leaves 2–4 by 1¼–2 in., ovate, acuminate, more or less pubescent, decurrent into the petiole which is therefore often obscure; main nerves 8–10 pairs, slender; petioles obscure owing to the decurrent leaf-blade. Axillary spines (*cladodes*) slender, ¼–¾ in. long, shortly densely and softly villous and also with long hairs, with 2 or 3 more or less flattened villous (hardly spinous) teeth (reduced leaves) at the apex. Flowers sessile in the midst of the cladodes; bracteoles subulate, shorter than the calyx. Calyx ⅛ in. long, divided almost to the base; sepals linear-subulate, densely hairy. Corolla ½ in. long, blue or lilac, 2-lipped about ¼-way down. Capsules ⅓ in. long, oblong, pointed, pubescent. Fl. B. I. v. 4, p. 507; Dalz. & Gibs. p. 197; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Dec.

KONKAN: Marmagão, *Woodrow*. DECCAN: Nasik, *Bhiva*!; Khandala, *Cooke*!, *Woodrow*! GUJARAT: Surat, *Woodrow*.—DISTRIB. India (W. Peninsula, Central India).

21. GYMNOSTACHYUM, Nees.

Herbs or undershrubs. Leaves cauline or subradical, entire, sinuate, crenulate or toothed. Flowers subsessile or shortly pedicellate, in axillary cymes or in a terminal panicle, often spicate or racemose; bracts and bracteoles usually minute. Calyx deeply divided; lobes equal, linear-lanceolate. Corolla 2-lipped; tube narrow, cylindric; lobes subequal, oblong-elliptic, imbricate. Stamens 2, nearly equalling the corolla, rarely exserted beyond it; filaments often hairy near the base; anthers 2-celled, the cells subequal, oblong or ovate, hairy or glabrous. Ovary 2-celled; ovules numerous in each cell; style slender; stigma subentire. Capsule linear, pubescent or glabrous, 16–24-seeded. Seeds broadly ovoid, compressed, hairy.—DISTRIB. India and Malaya; species 15.

Flowers in axillary racemes or panicles; stamens exserted beyond the corolla; capsule glabrous ..... 1. *G. latifolium.*
Flowers in terminal spikes or racemes; stamens not exserted beyond the corolla; capsule glandular-pubescent ..... 2. *G. glabrum.*

1. **Gymnostachyum latifolium,** *T. Anders. in Journ. Linn. Soc.* v. 2 (1867) p. 505. A glabrous undershrub 3 ft. high; stem erect, quadrangular, rough with small tubercles. Leaves large, 3½–8 by 2¾–6 in., broadly ovate, acute, glabrous, base rounded or truncate, sometimes (more rarely) acute; main nerves 10–14 pairs, prominent; petioles reaching 6 in. long. Flowers in axillary racemes or panicles often from

the axils of fallen leaves; bracteoles $\frac{1}{12}$ in. long, lanceolate; pedicels very short. Calyx $\frac{1}{4}$ in. long, glabrous, 5-partite; segments $\frac{1}{5}$ in. long, linear, acute. Corolla 1 in. long, 2-lipped; upper lip $\frac{3}{8}$ in. long, oblong, with 2 rounded short lobes $\frac{1}{16}$ in. long at the apex; lower lip 3-partite to the base, the lobes oblong, obtuse. Stamens exserted beyond the corolla; filaments flattened, glabrous; anthers glabrous; ovary and style glabrous. Capsules $\frac{7}{8}$ by $\frac{1}{10}$ in., linear, bluntly pointed, striate, glabrous, 24-seeded. Seeds $\frac{1}{30}$ in. in diam., suborbicular, much compressed, hairy when wetted. Fl. B. I. v. 4, p. 509; Bedd. Icon. Pl. Ind. Or. p. 61, t. 253; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Cryptophragmium latifolium*, Dalzell, in Kew Journ. Bot. v. 2 (1850) p. 137; Dalz. & Gibs. p. 185.—Flowers: Nov.–Dec.

S. M. Country: Chorla Ghát, *Dalzell*!; Castlerock, *Kanitkar*!, *Bhiva*!—Distrib. India (W. Peninsula).

2. **Gymnostachyum glabrum,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 506. An undershrub, nearly glabrous except the inflorescence; stems obtusely subquadrangular, more or less lenticellate. Leaves 4½–7 by 2–2¾ in., elliptic-lanceolate, acuminate, glabrous or nearly so, with undulate crenate or toothed margins, base tapering, often decurrent into the petiole; main nerves 10–12 pairs, prominent; petioles ¾ in. long, sometimes obscure. Flowers sessile or subsessile, in terminal branched spikes or racemes 6–10 in. long, in rather distant clusters along a glandular-pubescent rhachis; bracts ⅛ in. long, lanceolate, acute. Calyx glandular-hairy, ⅕ in. long, 5-partite; segments ⅙ in. long, linear-lanceolate, acute, ciliate with glandular hairs. Corolla white, spotted inside with purple spots, ⅝ in. long, glandular-pubescent outside, 2-lipped about ½-way down; upper lip ⅓ by ⅛ in., obovate-oblong, shortly 2-lobed at the apex; lower lip 3-lobed about ½-way down, the lobes ⅙ by $\frac{1}{12}$ in., oblong, obtuse. Stamens nearly reaching but not exserted beyond the top of the corolla; filaments hairy at their insertion in the corolla-tube, otherwise glabrous; anthers glabrous. Ovary minutely papillose, not pubescent; style slightly pubescent. Capsules ⅝ in. long by $\frac{1}{16}$ in. in diam., subcylindric, bluntly pointed, glandular-pubescent. Seeds $\frac{1}{30}$ in. in diam., much compressed, finely hairy when wetted. Fl. B. I. v. 4, p. 509; Bedd. Icon. Pl. Ind. Or. p. 61, t. 251; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Cryptophragmium glabrum*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 338; Dalz. & Gibs. p. 185.—Flowers: Dec.–Feb.

Konkan: shady woods of S. Konkan, *Dalzell*; Konkan, *Law*!; Ghâts, *Dalzell*! S. M. Country: Castlerock, *Cooke*!, *Kanitkar*!—Distrib. India (W. Peninsula).

Var. *denticulata*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 509, cannot stand as a variety. The leaves are not more denticulate than many of the leaves of the type. Dalzell & Gibson, Bo. Fl. p. 185, describe the leaves of the type as denticulate, glabrous, and Dalzell was the first to describe the plant.

Doubtful Species.

GYMNOSTACHYUM LONGIFOLIUM, T. Anders. MS. in Herb. Kew. There is a single sheet in Herb. Kew. named as above by Dr. Anderson, the specimens on which were collected in Kanara by Mr. Law. No further details as to habitat exist, so that there are no means of ascertaining whether the specimens came from N. or S. Kanara.

which latter district is outside the limits of the Bombay Presidency. Mr. C. B. Clarke (Hook. f. Fl. B. I. v. 4, p. 509) makes this a variety of *G. canescens*, T. Anders. There are no flowers on the specimens, but the leaves, which are 6-9 by 1-2 in., lanceolate-oblong, acute, glabrous, toothed, and decurrent almost to the base of the petiole, are very different from those of *G. canescens*, while the capsules, which reach 1 in. long, are larger than in that plant and are glabrous, those of *G. canescens* being glandular-hairy. From the fragments on the sheet the plant seems to be sufficiently distinct from *G. canescens* to warrant its maintenance as a separate species, but further specimens with flowers are needed and the habitat of the plant has to be determined.

22. **CROSSANDRA,** Salisb.

Undershrubs. Leaves opposite or whorled, entire or undulate, sometimes slightly toothed. Flowers sessile, in strobilate spikes; bracts imbricate; bracteoles linear or lanceolate, as long as the calyx. Calyx 5-partite to the base; the 2 lower sepals oblong, acute, 1-nerved, the upper sepal broader, 2-nerved, often 2-toothed, the 2 innermost sepals lanceolate, smaller than the outer. Corolla orange-yellow or red; tube long, linear, much longer than the limb; limb split down the back and forming a single flattened obtusely 5-lobed lip; lobes subequal, imbricate in bud. Stamens 4, didynamous, included in the corolla-tube; anthers small, 1-celled. Ovary 2-celled; ovules 2 in each cell; stigma 2-fid. Capsule oblong, subacute, usually 4-seeded. Seeds ellipsoid or suborbicular, compressed, clothed with appressed fringed scales formed of many connate hairs.—DISTRIB. India, Africa, Mascarene Islands; species 14.

1. **Crossandra undulæfolia,** *Salisb. Parad. Lond.* (1805) t. 12. An undershrub 2–3 ft. high (in cultivation often higher); branches terete, glabrous or nearly so. Leaves 4 in a whorl (decussate pairs inserted close to one another), 4–6 by 1¼–2 in., rather thick, lanceolate, acute, glabrous, shining, base much attenuated into the petiole; main nerves about 8 pairs, slender; petioles ½–1 in. long, often obscure owing to decurrent leaf-blade. Flowers numerous, in axillary often long-pedunculate quadrangular narrow spikes 3–6 in. long; bracts much imbricate, ⅝ by ¼ in., elliptic-lanceolate, mucronate, glandular-pubescent, nerved, ciliate; bracteoles ½ by $\frac{1}{20}$ in., narrowly linear with subulate points, glandular-pubescent. Calyx 5-partite to the base; upper sepal ½ by ⅛ in., 2-nerved, 2-toothed; 2 lower sepals ½ by $\frac{1}{12}$ in., 1-nerved, all three lanceolate, very acute, penicillate at the apex and ciliate with long white jointed fine hairs; inner sepals ⅜ by $\frac{1}{20}$ in., lanceolate-subulate, ciliate towards the tip with fine jointed hairs. Corolla orange-yellow, pubescent outside; tube ¾ in. long, slender; limb 1½ in. across. Capsules ⅝ in. long, oblong, subacute, glabrous. Seeds ⅛–⅕ in. in diam., compressed, densely clothed with fringed scales. Fl. B. I. v. 4, p. 492; Trim. Fl. Ceyl. v. 3, p. 332; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Crossandra axillaris*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 98; Dalz. & Gibs. p. 193; Wight, Icon. t. 460. *C. coccinea*, Dalz. & Gibs. Suppl. p. 71. *Ruellia infundibuliformis*, Roxb. Fl. Ind. v. 3, p. 41; Grah. Cat. p. 161.—Flowers: June–Jan. VERN. *Aboli.*

Very common in gardens and planted about temples, rarely found wild. KONKAN: *Law*! S. M. COUNTRY: about Dharwar, *Dalzell & Gibson.* KANARA: *Talbot*; Kumpta, *Woodrow*; Supa on the Kála naddi, *Ritchie*, 1950!—DISTRIB. India (W. Peninsula); Ceylon; cultivated in N. India, Bengal, and Malaya.

23. **BARLERIA,** Linn.

Armed or unarmed small shrubs or undershrubs. Leaves opposite, entire. Flowers showy, sessile, solitary or in dense or rather lax spikes; bracts and bracteoles large, small or 0. Calyx divided almost or quite to the base; sepals 4 in opposite pairs, the outer pair much the larger. Corolla infundibuliform; tube elongate; lobes 5, subequal, imbricate in bud. Stamens 2 fertile with oblong 2-celled anthers; usually 2 staminodes occasionally containing a little pollen also present, and often a rudimentary 5th. Disk large, cupular, half embracing the ovary, often with a toothed margin, Ovary 2-celled; ovules 2 in each cell; style long, stigma 2-fid or subentire. Capsule ovoid or oblong with 2 or 4 seeds below the middle. Seeds compressed, ovoid, usually clothed with wavy silky closely appressed hairs.—DISTRIB. Species 120, mostly in Africa and Tropical Asia, a few in Tropical America.

Spinous.
- Capsule 2-seeded; outer sepals spine-tipped.
  - Flowers spicate above; bracteoles linear-subulate ..... 1. *B. Prionitis.*
  - Flowers mostly solitary, axillary; bracteoles 0 or a few minute bristles ..... 2. *B. cuspidata.*
- Capsule with more than 2 seeds; outer sepals not spine-tipped.
  - Corolla exceeding 1 in. long.
    - Bracts of simple spines..... 3. *B. buxifolia.*
    - Bracts of spinous pinnatifid leaves or flattened pinnatifid spines ..... 4. *B. acanthoides.*
  - Corolla less than 1 in. long; bracts small, linear (spines sometimes wanting) ..... 5. *B. Hochstetteri.*

Spineless.
- Seeds hairy.
  - Bracteoles longer than or as long as the outer sepals ..... 6. *B. tomentosa.*
  - Bracteoles shorter than the outer sepals.
    - Outer sepals spinous ..... 7. *B. cristata.*
    - Outer sepals not spinous.
      - Corolla 3 in. long and upwards.
        - Corolla white..... 8. *B. Lawii.*
        - Corolla blue with reddish-purple tube ..... 9. *B. involucrata.* var. *elata.*
      - Corolla less than 3 in. long.
        - Inflorescence glabrous; corolla blue; capsule glabrous ..... 10. *B. montana.*
        - Inflorescence strigosely hairy; corolla blue; capsule glabrous ..... 11. *B. strigosa,* var. *terminalis.*
        - Inflorescence glandular-hairy; corolla with blue limb and yellow tube; capsule pubescent at the tip ..... 12. *B. courtallica.*
        - Inflorescence softly villous; capsule glabrous ..... 13. *B. sepalosa.*
- Seeds glabrous.
  - Outer sepals exceeding 1½ in. long; capsule 1½ in. long, glandular-pubescent; corolla pure white ..... 14. *B. grandiflora.*
  - Outer sepals not exceeding 1¼ in. long; capsule ⅝ in. long, glabrous; corolla pink ..... 15. *B. Gibsoni.*

1. **Barleria Prionitis,** *Linn. Sp. Pl.* (1753) p. 636. A shrub 2–5 ft. high, much-branched, usually prickly; bark whitish; stems and branches terete or obsoletely 4-gonous, glabrous. Leaves 3½–7 by 1–2¼ in., elliptic, acuminate, bristle-tipped, entire, lineolate, glabrous above, glabrous or more or less pubescent (especially the young leaves)

beneath, base tapering into the petiole; main nerves about 5 pairs; petioles 0–$\frac{3}{4}$ in. long, becoming shorter upwards, usually with 3 (sometimes 2 or 4) divaricate acicular spines in the axils. Flowers sessile, often solitary in the lower axils, becoming spicate above; bracts foliaceous, $\frac{5}{8}$ by $\frac{1}{6}$–$\frac{1}{5}$ in., oblong or oblong-lanceolate, acute, bristle-tipped, nearly glabrous; bracteoles $\frac{1}{2}$ in. long, narrowly linear-subulate (almost spinous), bristle-tipped. Calyx divided almost to the base; one of the two outer sepals rather more than $\frac{1}{2}$ in. long, the opposite sepal rather less than $\frac{1}{2}$ in. long, $\frac{1}{5}$–$\frac{1}{6}$ in. broad, both oblong-lanceolate with a long mucro, the 2 inner sepals $\frac{1}{16}$ in. wide and as long as the shorter of the outer ones, linear-lanceolate, mucronate. Corolla $1\frac{1}{4}$–$1\frac{3}{4}$ in. long, yellow, slightly pubescent outside, glabrous inside, somewhat 2-lipped; upper lip $\frac{3}{4}$ in. long or more, deeply 4-lobed, the lobes oblong-obovate, rounded; lower lip oblong-obovate, rounded, entire; tube $\frac{3}{4}$–$\frac{7}{8}$ in. long. Stamens 2 fertile and 2 staminodes; filaments of the fertile stamens exserted beyond the corolla-tube, those of the staminodes very short. Capsules $\frac{3}{4}$–1 in. long, ovoid, with a long tapering solid beak, 2-seeded. Seeds $\frac{1}{3}$ in. in diam., compressed, clothed with silky appressed hairs. Fl. B. I. v. 4, p. 482; Grah. Cat. p. 160; Dalz. & Gibs. p. 189; Wight, Icon. t. 452; Trim. Fl. Ceyl. v. 3, p. 318; Aitch. Pb. & Sind Pl. p. 112; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356; Watt, Dict. Econ. Prod. v. 1, p. 400.—Flowers: Oct.–Jan. VERN. *Kholeta*; *Pivala-Koránta.*

Common throughout the Presidency. KONKAN: *Stocks!*, *Law!*; Vingorla, *Woodrow!*; Matheran, *Cooke!*; Bombay (Malabar Hill), *Graham.* DECCAN: widely, *Woodrow*; Khandala, *Cooke!*; Poona, *Cooke!* GUJARAT: Deesa, *Stocks!* SIND: *Stocks*, 52!—DISTRIB. Throughout India; Ceylon, Tropical Asia, Tropical and S. Africa.

Often planted as a fence; the juice of the leaves is used medicinally by the natives, and is applied to the soles of the feet to harden them. See Watt, Dict. Econ. Prod. l. c.

2. **Barleria cuspidata,** *Heyne, ex Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 93. A low spiny branched shrub; stems and branches terete or obscurely 4-gonous, glabrous. Leaves subsessile, $1\frac{1}{2}$–$2\frac{1}{2}$ by $\frac{1}{4}$–$\frac{1}{2}$ in., oblong-lanceolate, acute, bristle-tipped, entire, densely lineolate, glabrous, pale beneath, with long divaricate slender spines often reaching 1 in. long in the axils. Flowers solitary in opposite axils, scarcely spicate at the ends of the branches; bracts $\frac{1}{2}$–$\frac{3}{4}$ by $\frac{1}{10}$–$\frac{1}{8}$ in.; bracteoles 0 or a few minute bristles. Calyx glabrous, somewhat leathery, divided nearly to the base; outer sepals lanceolate from a broad base, long-acuminate, spinous-tipped, parallel-nerved inside, the longer of the two sepals $\frac{3}{4}$ in., the opposite one $\frac{5}{8}$ in. long; lateral sepals linear-lanceolate, acute, $\frac{1}{2}$ in. long. Corolla yellow, $1\frac{1}{2}$ in. long, somewhat 2-lipped; upper lip of 4 obovate acute lobes; the lower lip rather shorter than the upper, obovate, acute, entire; tube $\frac{3}{4}$ in. long. Fertile stamens exserted beyond the corolla-tube; filaments flattened, those of the staminodes very short. Capsules $\frac{3}{4}$ in. long, ovoid, with a solid beak, 2-seeded. Seeds $\frac{1}{3}$ in. in diam., compressed, silky with appressed hairs. Fl. B. I. v. 4, p. 483; Wight, Icon. t. 451; Talb. Trees, Bomb. ed. 2, p. 266.

Dry districts of the Presidency, *Talbot.* KONKAN: *Stocks!*—DISTRIB. India (W. Peninsula).

3. **Barleria buxifolia,** *Linn. Sp. Pl.* (1753) p. 636. A low prickly leafy undershrub; stems and branches terete, clothed with spreading hairs. Leaves $\frac{1}{3}$–$\frac{3}{4}$ by $\frac{1}{4}$–$\frac{1}{2}$ in., subsessile, elliptic or obovate, sometimes almost suborbicular, acute or obtuse, mucronate, hairy, base usually acute; petioles 0–$\frac{1}{8}$ in. long. Flowers axillary, solitary; bracts in the axils of the leaves reduced to sharp slender straight simple spines $\frac{1}{2}$–$\frac{3}{4}$ in. long; pedicels very variable in length, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, slender. Calyx hairy, divided almost to the base; outer sepals in flower $\frac{1}{4}$–$\frac{3}{8}$ by $\frac{1}{5}$–$\frac{1}{6}$ in., mucronate (one of them sometimes with 2 or 3 spinous teeth at the apex), elongating in fruit, reticulately veined, ciliate; inner sepals $\frac{1}{5}$–$\frac{1}{4}$ by $\frac{1}{20}$–$\frac{1}{15}$ in., linear-lanceolate, acute. Corolla 1–$1\frac{1}{4}$ in. long, rose-colored or white; lobes $\frac{1}{4}$ in. long, broadly obovate, obtuse, veined. Capsules $\frac{5}{8}$–$\frac{3}{4}$ in. long, 4-seeded. Seeds $\frac{1}{6}$ in. long, broadly ovoid, silky-hairy. Fl. B. I. v. 4, p. 483; Grah. Cat. p. 160.

Konkan: *Law*!, *Nimmo* ex *Graham*.—Distrib. India (W. Peninsula).

4. **Barleria acanthoides,** *Vahl, Symb.* v. 1 (1790) p. 47. A stunted prickly branched undershrub scarcely 1 ft. high; branches terete, hoary with short velvety pubescence. Leaves dark-green, $\frac{5}{8}$–$1\frac{1}{2}$ by $\frac{1}{3}$–$\frac{1}{2}$ in., oblong or obovate, obtuse, mucronate, pubescent, attenuated at the base; main nerves about 5 pairs; petioles 0–$\frac{1}{4}$ in. long. Flowers in unilateral condensed racemes often reduced to a single flower; bracts $\frac{1}{2}$–$\frac{3}{4}$ in. long, membranous, spinous-pointed and spinous-pinnatifid or reduced to flattened pinnatifid spines. Calyx divided almost to the base; outer sepals subequal, $\frac{5}{8}$ by $\frac{7}{16}$ in., broadly ovate, acute, strongly mucronate (one of the pair usually with a stronger mucro than the opposite one), very conspicuously nerved and reticulately veined, soon turning yellowish-brown; inner sepals $\frac{1}{4}$ by $\frac{1}{12}$ in., lanceolate. Corolla pubescent outside, pure white, $2\frac{1}{2}$–$3\frac{1}{2}$ in. long or even longer, opening at sunset (*Stocks*); tube $2\frac{1}{4}$–$3\frac{1}{4}$ by $\frac{1}{8}$–$\frac{1}{6}$ in., cylindric, slightly enlarged just below the limb; lobes $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovate. Capsules $\frac{1}{2}$ in. long, ellipsoid, attenuated at both ends, glabrous. Seeds $\frac{1}{6}$ in. long, broadly ovoid, compressed, silky-hairy. Fl. B. I. v. 4, p. 484; Aitch. Pb. & Sind Pl. p. 112; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Oct.

In the Bombay Presidency confined to Sind. Sind: *Dalzell*, 28!, *Stocks*, 508!, *Bhola Puran*!, *Woodrow*; Jemadar ka Landa near Karachi, *Stocks*!—Distrib. India (Panjáb); Beluchistan, Abyssinia, Nubia, Egypt.

5. **Barleria Hochstetteri,** *Nees, in DC. Prodr.* v. 11 (1847) p. 231. A low rigid much-branched shrub 6–12 in. high, more or less spinescent; older branches woody, much intricately twisted, the younger ones herbaceous, shortly velvety-canescent. Leaves $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{3}$–$\frac{1}{2}$ in., oblong, obtuse, entire, more or less hairy with long appressed hairs, base tapering; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers pedicelled, usually in threes at the apex of short peduncle-like branchlets; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, pubescent, those of the lateral flowers often bracteate about the middle with 1 or 2 small linear bracts. Calyx divided to the base; outer sepals green, pubescent with glandular hairs, the larger of the pair $\frac{1}{2}$ in. long, nearly $\frac{3}{8}$ in. broad, ovate, the opposite sepal slightly shorter and narrower, acutely 2-fid at the apex; inner sepals white, $\frac{1}{4}$ in. long, $\frac{1}{20}$ in. broad, lanceolate, very acute, hairy on the back

Corolla ½–⅞ in. long, lilac; lobes oblong, rounded, emarginate. Ovary hairy. Capsules ⅜ in. long, ovoid with a solid beak, pubescent, 2-seeded near the base. Seeds $\frac{1}{10}$ in. in diam., suborbicular, silky-hairy, black. Fl. B. I. v. 4, p. 483; Wight, Icon. t. 1528; Aitch. Pb. & Sind Pl. p. 112; Boiss. Fl. Orient. v. 4, p. 523; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Oct.

Sind: *Dalzell*, 31!, *Stocks*, 501!, *Bhola Puran*!; Jemadar ka Landa near Karachi, *Stocks*!.—Distrib. Beluchistan, Arabia, Nubia, Abyssinia.

6. **Barleria tomentosa,** *Roth, Nov. Pl. Sp.* (1821) p. 314. A small shrub; branches terete, clothed with glandular and simple hairs. Leaves 1½–3 by ¾–1½ in., ovate, acuminate, more or less fulvous-hairy on both sides, densely so on the nerves beneath, lineolate, base usually rounded; petioles ¼–½ in. long. Flowers solitary or 2–3 on the top of an axillary peduncle; bracteoles foliaceous, ½–¾ in. long, lanceolate, clothed with glandular hairs. Calyx scarious, hairy at the base outside, conspicuously veined; outer sepals with hairy midrib and ciliate margins, the longer ⅝ by ¼ in., obovate-oblong, acute, apiculate, the opposite sepal slightly narrower, acute, apiculate or sometimes 2-fid; inner sepals ¼–⅓ in. long, $\frac{1}{10}$ in. wide, lanceolate, acute. Corolla reaching 2½ in. long; tube 1¾ in. long, narrow, cylindric below, infundibuliform for ½ in. below the limb; lobes of the limb ¾ in. long, elliptic-oblong, acute. Capsules ¾ in. long, obovoid, pointed at the apex, narrowed at the base, glabrous, 4-seeded, the 2 lower seeds sometimes suppressed. Seeds ⅕ in. long, appressedly silky-hairy. Fl. B. I. v. 4, p. 485; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Nov.

Rare. *Dalzell* without locality in Herb. Kew. S. M. Country: Badami, *Woodrow*. —Distrib. India (W. Peninsula).

7. **Barleria cristata,** *Linn. Sp. Pl.* (1753) p. 636. Herbaceous; stems more or less appressedly hairy, densely hairy at the nodes. Leaves 2½–4 by 1–1¾ in., elliptic-oblong, acute or acuminate, hairy on both sides, lineolate above, base tapering; main nerves 6–7 pairs; petioles ⅛–⅓ in. long. Flowers in axillary and terminal short ovate dense spikes; bracteoles conspicuous, ½ in. long, linear, acute, membranous, veined, pubescent, with ciliate and often distantly toothed margins. Calyx hairy at the base; outer sepals membranous, whitish, the longer 1 in. long by ⅓ in. broad (within the marginal spines), broadly lanceolate, long-acuminate, mucronate and with subspinous bristle-tipped teeth on the margins, the opposite sepal similar but slightly narrower and ¾ in. long, both with raised conspicuous nerves running out into the marginal spines and with raised conspicuous reticulate venation between the nerves, pubescent; inner sepals ⅓ by $\frac{1}{12}$ in., linear-lanceolate, acute, veined. Corolla pubescent outside, blue, 1–1¾ in. long; upper part of the tube widely infundibuliform; lobes ¾ in. long, obovate-oblong, rounded. Capsules ⅝ in. long, ellipsoid, acute at both ends, 4-seeded. Seeds ⅙ in. in diam., orbicular, compressed, silky-hairy. Fl. B. I. v. 4, p. 488; Grah. Cat. p. 160; Dalz. & Gibs. p. 188; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356; Watt, Dict. Econ. Prod. v. 1, p. 399.—Flowers: Dec. Vern. *Gokran*.

KONKAN: *Dalzell & Gibson*; W. Ghâts, *Woodrow*; Bombay (in gardens), *Graham*. DECCAN: hills, *Woodrow*; Kolapur, abundant, *Cooke*! S. M. COUNTRY: *Woodrow*. KANARA: *Talbot*.—DISTRIB. Throughout India, often grown in gardens.

VAR. *dichotoma*, Prain, Beng. Pl. (1903) p. 812. A variety with white flowers, a favorite plant of the Brahmins, often planted near temples and also grown in gardens, but not unmistakably wild in the Presidency. *Barleria dichotoma* (sp.), Roxb. Fl. Ind. v. 3, p. 39; Dalz. & Gibs. p. 188.

8. **Barleria Lawii,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 492. An erect shrub; branches terete, appressedly hairy. Leaves 4–5½ by 1¼–2 in., elliptic, acuminate, glabrous or slightly hairy and lineolate above, hairy on the nerves beneath, base tapering; nerves about 6 pairs; petioles ¼–⅓ in. long. Flowers solitary, axillary, or in short raceme-like cymes often forming a terminal panicle; bracteoles ¼–½ in. long, linear-lanceolate, hairy. Calyx divided almost to the base; outer sepals hairy on both surfaces, ⅜ in. broad, the longer of the pair 1⅓ in. long, elliptic-lanceolate, acute, the opposite sepal 1¼ in. long, shortly and acutely 2-toothed at the apex, all strongly nerved and reticulately veined; inner sepals ⅝–¾ by 1/12 in., lanceolate, acute, hairy, with membranous ciliate margins. Corolla white, parallel-nerved, the nerves showing very strongly in dried flowers, slightly hairy outside, 3–3½ in. long (reaching 4 in. long in one Matheran specimen); tube 2–2¾ in. long, about ⅛ in. broad below, narrowly infundibuliform in the upper part, enlarging to ⅜–½ in. in diam. below the limb; lobes obovate-oblong. Capsules ¾–1 by ¼–⅓ in., obovoid, compressed, pointed, narrowed at the base, glabrous. Seeds ⅕–¼ in. long and nearly as broad, obtuse, silky hairy. Fl. B. I. v. 4, p. 486; Talb. Trees, Bomb. ed. 2. p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356. *Barleria Beddomei*, T. Anders. ex Bedd. Icon. Pl. Ind. Or. p. 62, t. 258.—Flowers: Oct.

Dalzell without locality in Herb. Kew. KONKAN: *Stocks*!; Matheran, *Cooke*! DECCAN: Sinhagad hill near Poona, *Woodrow*!, *Beddome*. KANARA: North Kanara forests, *Talbot*.—DISTRIB. India (W. Peninsula).

9. **Barleria involucrata,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 92, VAR. **elata,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4, p. 486. A shrub 6 ft. high; stems branched, terete, appressedly hairy, swollen at the nodes. Leaves 4–9 by 1½–3 in., elliptic-lanceolate, acuminate, more or less pubescent, base tapering into the petiole; main nerves 8–10 pairs; petioles ½–2½ in. long. Flowers in unilateral raceme-like cymes often forming a large terminal panicle; pedicels short; bracteoles 1–1½ in. long, linear-lanceolate. Calyx appressedly hairy, divided almost to the base; outer sepals lanceolate, acuminate, ⅜ in. wide, many-nerved, the longer of the two 1¾ in. (or more), the shorter reaching 1½ in. long; inner sepals nearly 1 in. long, narrowly linear-lanceolate, very acute, pubescent on the back and with membranous margins. Corolla of a fine blue with a reddish-purple tube (*Dalzell*), 3–3¾ in. long; tube reaching 2 in. long, cylindric below, dilated in the upper part; lobes obovate, obtuse. Ovary pubescent at the apex. Capsules 1 by ⅓ in., narrowed at both ends, pubescent at the apex. Seeds more than ⅜ in. long, nearly as broad as long, broadly ellipsoid, obtuse, silky-hairy. *Barleria elata* (sp.), Dalz. in Kew Journ. Bot. v. 3 (1851) p. 227;

Dalz. & Gibs. p. 189; Talb. Trees, Bomb. ed. 2, p. 266. *Barleria involucrata*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356 (*not* of Nees).—Flowers: Oct.–Nov.

KONKAN: *Stocks*!; Amboli Ghát, *Woodrow*. DECCAN: Phunda Ghát, *Dalzell*!—DISTRIB. India (W. Peninsula).

This handsome species was grown in England in 1890 by Messrs. Veitch & Sons, who introduced it, the Gardener's Chronicle [v. 7 (1890) p. 448] states, from Singapore.

10. **Barleria montana,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 92. Suffruticose, erect, 2–3 ft. high; branches glabrous, with distant nodes. Leaves 3–6 by 1½–2¾ in., elliptic, acuminate, glabrous or nearly so, lineolate on the upper side, attenuated at the base; main nerves 5–6 pairs; petioles ¼–1 in. long. Flowers axillary, solitary and running into terminal spikes or racemes; pedicels very short or 0; bracteoles varying from ¼–1 in. long, narrowly linear, acute. Calyx glabrous or nearly so; outer sepals subequal, 1¼–1½ by ¾ in., ovate, acute, with rounded base, strongly nerved and reticulately veined; inner sepals nearly ¾ by $\frac{1}{10}$ in., linear-lanceolate, very acute, thick, membranous, glabrous, with a strong midnerve. Corolla blue, reaching 2½ in. long; tube 1½ in. long; lobes obovate-oblong. Staminodes without anthers. Capsules ¾–⅞ in. long, oblong, acuminate, normally 4-seeded, glabrous. Seeds ¼ in. long and as broad, densely clothed with silky hairs. Fl. B. I. v. 4, p. 487; Grah. Cat. p. 161, n. 1182; Dalz. & Gibs. p. 189; Bedd. Icon. Pl. Ind. Or. p. 62, t. 257; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356; Watt, Dict. Econ. Prod. v. 1, p. 400.—Flowers: Sept.–Oct. VERN. *Kolista*.

KONKAN: *Stocks*!; Bombay, *Law*!; Island of Karanja, *Dalzell*!; Cross Island, *Graham, Dalzell & Gibson*; W. Ghâts, *Woodrow*; Uran in Bombay Harbour, entrance of northern valley, *Dalzell*! KANARA: *Talbot*.—DISTRIB. India (W. Peninsula).

11. **Barleria strigosa,** *Willd. Sp. Pl.* v. 3 (1800) p. 379, VAR. **terminalis,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4, p. 490. A shrub 3–4 ft. high; stems more or less sparsely strigose. Leaves 4½–6 by 1½–2½ in., elliptic-lanceolate, acuminate, lineolate on the upper side, sparsely strigosely hairy above, more densely so on the nerves and veins beneath with long, often bulbous-based hairs, margins ciliate, base decurrent wing-like into the petiole; main nerves 6–8 pairs; petioles ½–1 in. long, often obscure from the decurrent leaf-blade. Flowers in terminal strigosely hairy spikes often crowded at the tops of the branches; bracteoles ⅜–½ in. long, lanceolate, hairy on the back and with ciliate margins. Calyx densely strigosely hairy; outer sepals herbaceous, subequal, ¾–1 by ⅓ in., elliptic-lanceolate, subacute, strigose with long stout hairs and with ciliate margins; inner sepals $\frac{7}{16}$ by $\frac{1}{12}$ in., linear, acute, thick, densely clothed with appressed white silky hairs. Corolla blue, the tube paler than the limb, glabrous, reaching 2½ in. long; tube infundibuliform in the upper part; lobes ¾ in. long, obovate-oblong, obtuse. Filaments of the stamens and staminodes hairy at the very base. Capsules ¾ in. long, oblong-ellipsoid, acute, glabrous, 4-seeded. Seeds ¼ by ⅙ in., ellipsoid, compressed, silky-hairy. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356. *Barleria terminalis* (sp.), Nees, in DC. Prodr. v. 11 (1847) p. 225; Dalz. & Gibs. p. 188. *B. cœrulea*, Grah. Cat. p. 161.—Flowers: Nov.–Dec.

KONKAN: Vingorla, *Woodrow*; Marmagão, *Woodrow*; Matheran, *H. M. Birdwood, Cooke*! DECCAN: Fitzgerald Ghát, below Mahableshwar, *Cooke*!, *H. M. Birdwood*. S. M. COUNTRY: Belgaum, *Ritchie*!—DISTRIB. India (W. Peninsula).

VAR. *polystachya*, C. B. Clarke, in Hook. f. Fl. B. I. l. c. Leaves very large, fulvous-hirsute above, somewhat glaucescent beneath; spikes densely agglomerated, yellow-hirsute. *Barleria polystachya* (sp.), Nees, in DC. Prodr. v. 11, p. 226.

KONKAN: *Stocks*!

12. **Barleria courtallica,** *Nees, in DC. Prodr.* v. 11 (1847) p. 226. A shrub 3–4 ft. high; stems and branches glabrous. Leaves 5–7 by $1\frac{3}{4}$–$2\frac{1}{2}$ in. (in one specimen collected by Ritchie in the S. Konkan the leaves are 10 in. long), elliptic-lanceolate, long-acuminate, glabrous, shining, lineolate on both sides, base acutely tapering into the petiole; main nerves 6–9 pairs, slender; petioles $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Flowers subsecund, in dense axillary and terminal glandular-hairy narrow spikes 1–4 in. long; bracts and bracteoles $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear-lanceolate, glandular-hairy. Calyx glandular-hairy outside; outer sepals subequal, $\frac{3}{4}$–1 by $\frac{1}{4}$–$\frac{1}{3}$ in., ovate-lanceolate, bluntly long-acuminate, 7–9-nerved from the base, densely glandular-hairy outside, appressedly silky-hairy inside, one of the pair very slightly 2-toothed at the apex; inner sepals $\frac{5}{8}$–$\frac{3}{4}$ by $\frac{1}{10}$ in., linear-subulate, usually spreading outwards and not enclosed within the larger sepals, ciliate. Corolla $1\frac{1}{2}$–2 in. long with a blue limb and yellow tube, glabrous outside; tube hairy inside at the insertion of the filaments; lobes $\frac{5}{8}$ in. long, obovate-oblong, rounded. Ovary pubescent at the apex; style pubescent at the very base. Capsules $\frac{3}{4}$–1 in. long, oblong, pointed, pubescent at the tip, 4-seeded. Seeds $\frac{1}{4}$ in. in diam., broadly ellipsoid, compressed, silky-hairy. Fl. B. I. v. 4, p. 489; Dalz. & Gibs. p. 188; Wight, Icon. t. 1529; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Feb.

KONKAN: *Stocks*!, *Law*!; Baitsi (S. Konkan), *Ritchie*, 1941! S. M. COUNTRY: Chorla Ghát, *Dalzell*! KANARA: *Talbot*; Arbail Ghát (N. Kanara), *Woodrow*.—DISTRIB. India (W. Peninsula).

13. **Barleria sepalosa,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1884) p. 487. Shrubby; branches densely villous. Upper leaves (the only ones on the specimens) 3 by $1\frac{1}{4}$ in., elliptic-lanceolate, acute, mucronulate, hairy above with short bulbous-based hairs, shortly fulvous-hairy beneath; base subacute; main nerves 6–8 pairs, strong beneath, with close and prominent reticulate venation between; petioles $\frac{3}{8}$ in. long, densely fulvous-hairy. Flowers solitary, or in 2–3-flowered axillary cymes; pedicels very short, almost 0; bracteoles $\frac{3}{4}$–$\frac{7}{8}$ by $\frac{1}{6}$–$\frac{1}{4}$ in., lanceolate, acute, hairy, ciliate. Calyx (in fruit) very large; outer sepals (in fruit) yellow-villous, somewhat scarious, one very slightly longer than the other, $1\frac{1}{2}$–$1\frac{3}{4}$ by $\frac{3}{4}$–$\frac{7}{8}$ in., ovate-elliptic, acute, apiculate, with rounded base and numerous prominent nerves and reticulate veins, the shorter of the outer pair of segments sometimes (not always) 2-toothed at the apex; inner pair of sepals $\frac{1}{2}$ by $\frac{1}{10}$ in., linear, acute, densely hairy. Corolla not seen. Capsules $\frac{7}{8}$ in. long, oblong, narrowed at both ends, glabrous. Seeds $\frac{1}{4}$ in. long, as broad as long, broadly ellipsoid, flattened, obtuse, densely silky hairy. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.

KONKAN: *Gibson* in Herb. Kew.!
There is but one sheet in Herb. Kew. with a ticket as above. It contains 2 pieces of the plant, one 10 in. the other 4 in. long, both upper portions of flowering branches furnished with bracteoles, calyx and capsules, but no flowers.

14. **Barleria grandiflora,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 339. Shrubby; branches terete, quite glabrous except for a few small hairs at the nodes. Leaves 5–7 by $1\frac{1}{2}$–$2\frac{1}{4}$ in., elliptic-lanceolate, acuminate, glabrous, base acutely tapering; main nerves 8–10 pairs; petioles $\frac{1}{6}$–$\frac{1}{2}$ in. long. Flowers axillary, solitary; bracteoles $\frac{1}{2}$ in. long, linear-ligulate. Outer sepals very large, herbaceous, $1\frac{3}{4}$–$2\frac{1}{2}$ by 1–$1\frac{1}{2}$ in., subequal, ovate-oblong, acute or subobtuse, rounded at the base, glabrous outside, pubescent within, one of the sepals with 2 acutely triangular teeth at the apex; inner sepals $\frac{7}{8}$ in. long, linear, acute, densely hairy. Corolla white, $3\frac{1}{2}$–$4\frac{1}{2}$ in. long, pubescent outside; tube enlarging towards the top, becoming narrowly infundibuliform; lobes $1\frac{1}{3}$ in. long, obovate, subacute. Capsules shorter than the calyx, $1\frac{1}{2}$ in. long, oblong, acuminate, glandular-pubescent. Seeds $\frac{3}{8}$ by $\frac{1}{4}$ in., broadly elliptic, subobtuse, compressed, glabrous. Fl. B. I. v. 4, p. 488; Dalz. & Gibs. p. 189; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Nov.

Rare. KONKAN: *Stocks*!; Talkat Ghát, *Dalzell*!; Mangeli Ghát, *Dalzell & Gibson.* KANARA: Yellapur (N. Kanara), *Talbot*, 282!—DISTRIB. India (W. Peninsula).
Barleria Lawii, T. Anderson, is often mistaken for this, but the two plants are quite distinct.

15. **Barleria Gibsoni,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 339. Suffruticose, glabrous. Leaves elliptic, acuminate, 4–7 by 2–4 in., glabrous, lineolate above, glaucous beneath, base rounded or subacute; main nerves 5–8 pairs; petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long. Flowers solitary, axillary, and in terminal spikes; bracts foliaceous, 1 in. long, elliptic-lanceolate, acute, glabrous; bracteoles $\frac{1}{2}$ in. long, narrowly linear, acute. Calyx glabrous or nearly so; outer sepals subequal, $1\frac{1}{4}$ by $\frac{3}{4}$ in., elliptic-oblong or obovate-oblong, usually rounded at the apex and more or less narrowed towards the base, strongly nerved and reticulately veined; inner sepals $\frac{5}{8}$ by $\frac{1}{12}$ in., linear-lanceolate, acute, hairy on both sides, ciliolate, veined. Corolla glabrous, of a fine pink, reaching $3\frac{1}{2}$ in. long; tube up to $2\frac{1}{2}$ in. long, enlarged upwards; lobes obovate, rounded. Staminodes without anthers. Capsules $\frac{7}{8}$ in. long, oblong, acuminate, glabrous. Seeds $\frac{1}{4}$ by $\frac{1}{5}$ in., ellipsoid, black, quite glabrous. Fl. B. I. v. 4, p. 487; Dalz. & Gibs. p. 189; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Sept.–Nov. VERN. *Gura.*

KONKAN: *Stocks*!; Ghâts and Brahminwara range, *Dalzell & Gibson*; Matheran Ghát, *H. M. Birdwood.* S. M. COUNTRY: hills 4 miles east of Belgaum, *Ritchie*, 1149! KANARA: *Talbot.*—DISTRIB. India (W. Peninsula).

Barleria lupulina, Lindl. in Bot. Reg. t. 1483. A small shrub about 2 ft. high, a native of the Mauritius, occasionally grown in gardens. The yellow flowers are in terminal ovoid or oblong spikes with large green bracts forming a head like that of a hop. Fl. B. I. v. 4, p. 482; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.

24. **NEURACANTHUS,** Nees.

Herbs or undershrubs. Leaves entire. Flowers small, sessile and solitary in the axils of opposite bracts, densely spicate; spikes axillary (rarely terminal), elongate, strobilate, or densely capitate; bracts imbricate, strongly nerved; bracteoles 0 or minute. Calyx 2-partite, the upper segment 3-toothed or 3-lobed, the lower 2-toothed, or 2-lobed, or 2-partite. Corolla tubular-infundibuliform; tube more or less dilated above; limb plicate, sub-bilabiate or entire, when 2-lipped the upper lip narrow, shortly 2-lobed or 2-toothed, the lower 3-lobed or 3-angled. Stamens 4, didynamous, inserted on the middle of the tube, included; anthers of the lower and longer pair perfectly 2-celled, those of the upper pair with one perfect and one imperfect cell. Disk inconspicuous. Ovary 2-celled; ovules usually 2 in each cell; style short, glabrous; stigma of one oblong lobe. Capsule oblong, glabrous, 4- or 2-seeded. Seeds much compressed, ovoid or suborbicular, hairy.—DISTRIB. India and Tropical Africa; species 12.

Spikes elongate; corolla 2-lipped	1. *N. trinervius.*
Spikes globose; corolla entire	2. *N. sphærostachys.*

1. **Neuracanthus trinervius,** *Wight, Icon.* v. 4 (1850) t. 1532. Shrubby, erect, 1–3 ft. high; stems slender, usually pale, glabrous or nearly so. Leaves sessile, 3½–5 by 1¼–1¾ in., elliptic-lanceolate, acute, lineolate on both sides, otherwise glabrous or nearly so, pale green; main nerves 7–8 pairs, conspicuous below, the midnerve very strong. Flowers in axillary hairy spikes 1–6 in. long; bracts ⅓ by ⅛ in., broadly ovate, acute, spinous-pointed, strongly 5–7-nerved, hairy and ciliate with long hairs; bracteoles 0 or represented by a few bristles. Calyx 2-lipped to the base, the upper and lower lips divided more than ½-way down, the upper into 3, the lower into 2 segments, which are lanceolate, acute, ciliate with slender white hairs, ⅛ in. long. Corolla blue, ⅓–½ in. long, 2-lipped; upper lip ⅕ in. long with 2 small triangular penicillate teeth at the apex; lower lip with 3 shallow rounded or subacute lobes, each lobe finely apiculate and penicillate at the tip. Capsules ¼–⅓ by 1/12 in., oblong, acuminate, glabrous. Seeds 1/12–1/10 in. long, broadly ovoid, compressed, silky. Wight's figure shows the calyx-lips reversed, the 3-lobed lip being shown immediately beneath the bract instead of the 2-lobed one. Fl. B. I. v. 4, p. 491; Dalz. & Gibs. p. 190; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356.—Flowers: Dec.

KONKAN: *Stocks!, Dalzell!*; Salsette, *Law!, Dalzell!*; hills near Alibag, *Dalzell & Gibson.* DECCAN: Khandala, *Cooke!, Woodrow!* KANARA: moist forests of N. Kanara, *Talbot*; below the fall on the Kála naddi, *Ritchie,* 1210!—DISTRIB. India (W. Peninsula).

2. **Neuracanthus sphærostachys,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 140. Stems erect, 1½–2 ft. high, numerous from a perennial root, simple, obtusely quadrangular, more or less scabrous-pubescent. Leaves subsessile, 2½–4 by 1½–2¼ in., elliptic-oblong, obtuse, very shortly acuminate, lineolate on both sides, nearly glabrous, base rounded, truncate or subcordate; main nerves about 8 pairs. Flowers in globose congested silky-hairy spikes sessile in the opposite axils, much enlarged after flowering, sometimes to 1½ in. in diam.; bracts ½ by ⅜ in.,

purplish, broadly elliptic or suborbicular, shortly and abruptly acuminate, hairy on both sides and with ciliate margins, strongly 5–7-nerved from the base, reticulately veined. Calyx ½ in. long, 2-lipped to the base, densely silky-hairy on both sides; upper lip 3-lobed about ½-way down, the lobes lanceolate, acute, densely ciliate, veined; lower lip divided almost to the base, the segments lanceolate, acute, ciliate. Corolla ½ in. long with white tube and blue limb; tube slender, cylindric, as long as the calyx; limb infundibuliform, plicate, entire, nearly ½ in. across when expanded, with 5 hairy 3-nerved penicillate bands on the outside, two of which are close together, the others distant from one another. Capsules ½ by ⅕ in., ovoid, subacute, shortly attenuated at the base, quite glabrous. Seeds ⅛ in. in diam., orbicular, densely silky. Fl. B. I. v. 4, p. 491; Dalz. & Gibs. p. 190; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 356. *Neuracanthus Lawii*, Wight, Icon. t. 1531.—Flowers: Sept.–Oct.

Dalzell (*l. c.*) has a long note on the limb of the corolla of this plant.

Konkan: *Stocks*!; island of Karanja (Bombay Harbour), *Dalzell & Gibson*; Malabar Hill (Bombay), *Dalzell & Gibson*; Pen, *Woodrow*. Deccan: Khandala, *Cooke*!, *Woodrow*!; Bahuli near Poona, *Bhiva*!; Karkala, *Kanitkar*! S. M. Country: Padshapur jungles, *Ritchie*, 1199!—Distrib. India (W. Peninsula), apparently endemic.

25. **ASYSTASIA,** Blume.

Herbs or undershrubs. Leaves opposite, entire. Flowers in lax or dense usually 1-sided simple or compound spikes or racemes; bracts and bracteoles linear, usually shorter than the calyx. Calyx deeply divided; segments equal, linear or linear-lanceolate. Corolla-tube inflated above; lobes subequal (in *A. Lawiana* the lower lobe broader than the other 4), imbricate in bud. Stamens 4, all perfect, didynamous, subequal; anthers oblong, the cells parallel, approximate, minutely spurred or submuticous at the base. Ovary 2-celled; ovules 2 in each cell; style linear; stigma minutely 2-fid or subcapitate. Capsule elliptic-clavate with contracted solid base, 4-seeded. Seeds compressed, orbicular or irregularly angular, glabrous, rugose or tuberculate.—Distrib. Warmer parts of the Old World; species 35.

Bracts shorter than the calyx; inflorescence secund.	
Bracts ⅛ in. long; corolla white or pale blue	1. *A. coromandeliana.*
Bracts ¼ in. long; corolla violet with darker lower lobe	2. *A. violacea.*
Bracts longer than the calyx; inflorescence not secund ...	3. *A. Lawiana.*

1. **Asystasia coromandeliana,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 89. Erect or procumbent, sometimes climbing among bushes. Stems 1–3 ft. long, much-branched, obtusely quadrangular, glabrous. Leaves 1–2¼ by ¾–1½ in., ovate, acute, lineolate, dark green and glabrous above, paler and slightly pubescent on the nerves beneath, base usually rounded or subcordate, rarely acute; main nerves 5–6 pairs; petioles ½–1 in. long. Flowers secund, in long lax terminal and axillary spike-like racemes; pedicels of the lower flowers reaching ⅛ in. long, those of the upper shorter or almost 0; bracts and bracteoles below the pedicels 1/10–⅛ in. long, ovate-lanceolate, acute, ciliate. Calyx nearly ¼ in. long, divided to the base or nearly so; sepals linear-lanceolate, acute, pubescent. Corolla 1½ in. long, pubescent outside, pale-blue with a yellowish tube and usually a purple blotch on the lowest lobe; tube ¾ in. long,

inflated in the upper part for about $\frac{2}{3}$ of its length; lobes of the limb rounded. Ovary hairy; lower part of style hairy. Capsules 1–1$\frac{1}{4}$ in. long with long solid base, clavate, pointed, pubescent, usually constricted about the middle of the enlarged upper part, 4-seeded. Seeds $\frac{1}{5}$ in. in diam., tuberculate, glabrous. Fl. B. I. v. 4, p. 493; Dalz. & Gibs. p. 186; Trim. Fl. Ceyl. v. 3, p. 323; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Asystasia gangetica*, T. Anders. in Thw. Enum. p. 235; Lindau, in Engl. & Prantl, Pflanzenf. v. 4, 3 B, p. 326, fig. 131. *Justicia gangetica*, Linn. Amœn. Acad. v. 4, p. 299. *Ruellia zeylanica*, Kœn. ex Roxb. Fl. Ind. v. 3, p. 42; Grah. Cat. p. 161.—Flowers: Nov.–Dec.

Konkan: *Stocks*!, *Law*!; W. Ghâts, *Woodrow*. Deccan: Khandala, *Graham*. S. M. Country: 4 miles S. of Belgaum, *Ritchie*! Often cultivated in gardens.—Distrib. India (W. Peninsula); Ceylon, Tropical and S. Africa.

2. **Asystasia violacea,** *Dalz. MS. ex C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1884) p. 494 (*not* Dalz. in Kew Journ. Bot. v. 2, p. 139). Stems ascending, smooth, jointed, striate, obtusely quadrangular. Leaves 2–6 by 1$\frac{1}{4}$–2$\frac{1}{2}$ in., elliptic-lanceolate, acute, glabrous or nearly so, the lower leaves with long petioles, attenuated at the base, the upper leaves with short petioles, often rounded at the base; main nerves 8–10 pairs, prominent beneath. Flowers secund, in solitary or twin terminal racemes; pedicels $\frac{1}{10}$–$\frac{1}{8}$ in. long; bracts $\frac{1}{4}$ in. long, linear, acute, ciliate with long hairs; bracteoles $\frac{1}{8}$ in. long, ovate-oblong, acute, ciliate. Calyx $\frac{3}{8}$ in. long, divided nearly to the base, coarsely hairy; sepals linear, acute, ciliate with long hairs. Corolla 1$\frac{1}{4}$–1$\frac{1}{2}$ in. long, violet, somewhat 2-lipped, the 4 upper lobes reflexed, the lower lobe lip-like, of a much darker violet, projecting (not reflexed). Ovary hairy; style hairy at the base, glabrous above. Capsules 1–1$\frac{1}{4}$ in. long, clavate, pointed, pubescent, with solid striate base. Seeds $\frac{1}{5}$ in. long, obovoid-oblong, glabrous, tuberculate. Dalz. & Gibs. p. 186; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Nov.

Dalzell, in Herb. Kew. without locality. Konkan: *Stocks*!; Bassein, *Woodrow*; Miradonger near Pen, *Stocks*!; Matheran, *Cooke*!, *Woodrow*. Deccan: Khandala, *Cooke*!; Panchgani, *Cooke*!; Mahableshwar, *Cooke*!, *H. M. Birdwood*. S. M. Country: Belgaum, *Ritchie*, 595!—Distrib. India (W. Peninsula), apparently endemic.

3. **Asystasia Lawiana,** *Dalz. in Kew Journ. Bot.* v. 4 (1852) p. 344. Herbaceous, erect, 1–3 ft. high; stems quadrangular, grooved, nodose, thinly hairy. Leaves 1$\frac{1}{2}$–4 by 1–1$\frac{3}{4}$ in., elliptic-oblong, acute, lineolate above, slightly hairy on the nerves on the upper side, more densely so beneath, base acute, sometimes unequal-sided; main nerves 5–6 pairs with reticulate venation between them; petioles $\frac{3}{4}$–1$\frac{1}{4}$ in. long. Flowers (not secund) in terminal substrobiliform spikes 1–2 in. long; bracts $\frac{3}{4}$ by $\frac{1}{4}$ in., lanceolate, very acute, 3-nerved, reticulately veined, hairy and ciliate; bracteoles similar to the bracts but smaller, $\frac{1}{2}$ by $\frac{1}{6}$ in. Calyx $\frac{1}{5}$–$\frac{1}{4}$ in. long, divided almost to the base; sepals linear-subulate, glandular-pubescent. Corolla white, $\frac{1}{2}$–$\frac{5}{8}$ in. long, sub-bilabiate; upper lip equally 4-lobed, the lobes obovate-oblong, rounded, $\frac{1}{8}$ by $\frac{1}{10}$ in.; lower lip $\frac{1}{6}$ in. long and as broad as long, oblong, rounded. Ovary glandular-puberulous; style pubescent at the base. Capsules $\frac{3}{4}$ in. long, glandular-pubescent, clavate, with solid base, the enlarged part con-

stricted in the middle between the seeds, 4-seeded. Seeds obliquely ovoid, flat-compressed, with dentate margins, the faces tuberculate and with hexagonal areolæ round the edges. Fl. B. I. v. 4, p. 496; Dalz. & Gibs. p. 186; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Aug.-Sept.

Deccan: Bhor, *Kanitkar*! S. M. Country: Belgaum, *Ritchie*, 1148!, *Cooke*!, *Woodrow*; near Dharwar, *Dalzell & Gibson*.—Distrib. India (W. Peninsula), apparently endemic.

26. **ERANTHEMUM,** Linn.

Glabrous shrubs or undershrubs. Leaves usually entire. Flowers subsessile, 1–3 in the axils of opposite bracts, arranged in terminal, dense or interrupted, simple or branched spikes; bracts and bracteoles narrow, small. Calyx 5-fid or 5-partite; segments narrow, subequal. Corolla-tube elongate, narrow-cylindric, rarely widened at the throat; limb 5-partite, the lobes elliptic, spreading, flat, subequal. Stamens 2 fertile, with usually 2 upper small clavate staminodes; anthers ovate or oblong, 2-celled; cells oblong, equal, parallel; connective widened. Disk annular or shortly cupular. Ovary 2-celled, usually glabrous; ovules 2 in each cell; style filiform; stigma entire or minutely 2-lobed. Capsule oblong, 4-seeded at top, contracted below into a long solid stalk. Seeds compressed, orbicular or subquadrate, rugose or smooth, supported on acute retinacula.—Distrib. Warmer parts of the world; species 50.

1. **Eranthemum malabaricum,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1884) p. 497. An undershrub 1½–2 ft. high, erect; stems and branches terete, glabrous. Leaves 3–5 by 1¼–2¼ in., ovate or elliptic, acute or acuminate, rather thick, faintly crenulate, minutely lineolate and shining above, glabrous, base tapering; main nerves 5–7 pairs; petioles ¼–¾ in. long. Flowers in opposite clusters of 1–3 on long, slender, glandular-puberulous interrupted spikes 4-9 in. long; bracts ⅛ in. long, linear-lanceolate; bracteoles similar but smaller, ⅛ in. long. Calyx ⅕ in. long, glandular-puberulous, divided almost to the base; segments linear, acute. Corolla white, 1¾ in. long, glabrous; tube 1¼ in. long, slender, nearly straight, scarcely widened close to the limb; lobes of the limb obovate-oblong, rounded, spreading, the lower a little longer than the others, spotted with purple dots. Ovary glabrous; style filiform, slightly pubescent at the base. Capsules ¾ in. long with narrow cylindric solid base, clavate, pointed, glandular-pubescent, slightly constricted between the seeds. Seeds suborbicular, compressed, reticulato-rugose, glabrous, ⅙ in. long. Trim. Fl. Ceyl. v. 3, p. 325; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Eranthemum crenulatum*, Wall. Cat. 2491 (*not* of Lindl.); Dalz. & Gibs. p. 195.—Flowers: Dec.

Konkan: *Law*!, *Stocks*!; Wari jungles, *Dalzell & Gibson*; Viziadrug, *Kanitkar*!; Marmagão, *Woodrow*! Deccan: Phunda Ghát, *Ritchie*, 598! Kanara: evergreen forests of N. Kanara, *Talbot*; Mulas, *Ritchie*, 598!—Distrib. India (W. Peninsula); Ceylon.

Eranthemum bicolor, Schrank, Pl. Rar. Hort. Monac. (1819) t. 8. A small shrub with dark-green ovate acuminate leaves and white flowers,

the lowest lobe of the corolla of which is dotted with purple. It is a native of the Philippine Islands. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357 & Gard. in Ind. ed. 5, p. 415. *Eranthemum aspersum*, Hook. f. Bot. Mag. (1868) t. 5711.

27. **LEPIDAGATHIS,** Willd.

Herbs or undershrubs often pubescent. Leaves entire or crenate-serrate. Flowers sessile, usually capitate, sometimes opposite or solitary; heads axillary or terminal, almost always dense, often 1-sided, sometimes fascicled; bracts usually conspicuous; bracteoles usually smaller than the bracts. Calyx 5-lobed, the lobes unequal, the 2 lower often more or less connate, making the calyx 4-partite, the connate segments usually easily separable. Corolla small, 2-lipped; tube narrowly cylindric below, often constricted beneath the throat, suddenly swollen at or above the middle; upper lip erecto-patent, usually notched or 2-fid; lower lip with 3 spreading lobes. Stamens 4, didynamous, attached at the base of the throat, included; anthers 2-celled, 1 of the cells often attached higher up than the other, the cells frequently bearded, somewhat divergent. Disk annular. Ovary 2-celled; ovules 2 (rarely 1) in each cell; style recurved; stigma capitellate, shortly 2-lobed or entire. Capsule ovoid-oblong or lanceolate, compressed. Seeds 2 or 4, compressed, ovoid, oblong or orbicular, hairy.—DISTRIB. Warmer parts of the world, few in America; species 80.

Seeds 2.
- Capsule with scarious back, irregularly rupturing, only ultimately 2-valved; seeds with long, mucilaginous hairs.
  - Calyx 4-partite.
    - Bracts spinous-pointed ..... 1. *L. cristata.*
    - Bracts not spinous-pointed ..... 2. *L. mitis.*
  - Calyx 5-partite.
    - Bracts glabrous, with recurved apical spines; calyx-segments thinly membranous, not spinous-pointed. 3. *L. trinervis.*
    - Bracts softly hairy, with straight apical spines; calyx-segments thick, spinous-pointed ..... 4. *L. lutea.*
- Capsule early 2-valved, not scarious on the back; seeds with short, not mucilaginous hairs.
  - Erect; bracts and bracteoles silky-hairy ..... 5. *L. clavata.*
  - Prostrate, creeping and rooting; bracts and bracteoles glandular-hairy ..... 6. *L. prostrata.*

Seeds 4.
- Leaves longitudinally folded ..... 7. *L. rigida.*
- Leaves not longitudinally folded.
  - Erect undershrubs.
    - Leaves of the stem exceeding 2 in. long; bracts and calyx-segments thick, glandular-hairy ..... 8. *L. cuspidata.*
    - Leaves of the stem less than 1 in. long; bracts and calyx-segments scarious ..... 9. *L. calycina.*
  - Diffuse or prostrate herbs.
    - A prostrate perennial herb; bracts $\frac{1}{16}$ in. broad, scarious; calyx-segments finely spinous ..... 10. *L. incurva*, var. *mucronata.*
    - A diffuse weak herb; bracts $\frac{1}{8}$ in. broad, herbaceous; calyx-segments not spinous ..... 11. *L. fasciculata.*

1. **Lepidagathis cristata,** *Willd. Sp. Pl.* v. 3 (1800) p. 400. Rootstock perennial; stem scarcely any; branches numerous, spreading

on all sides close to the ground, sometimes rooting, slender, quadrangular (sometimes almost winged), glabrous or nearly so. Leaves opposite, sessile, ¾–1½ by ⅛–⅜ in., linear-oblong or lanceolate-oblong, lineolate above, hairy on the nerves beneath. Flowers in a subradical globose head (sometimes with 1 or 2 smaller heads added) on the lower part of the leafy branches; bracts ⅓ in. long, ovate, acuminate, spinous-pointed, hairy; bracteoles membranous, hairy, spinescent. Calyx ⅓ in. long, 4-partite about ¾ the way down, densely softly hairy on both surfaces; the 2 larger outer segments ⅛ in. broad, elliptic, acute, the lower segment 2-fid; the 2 lateral segments $\frac{1}{20}$ in. broad, all ciliate and spinous-pointed. Corolla hairy outside, reaching ½ in. long, white or pale-pink, dotted with brown or purple spots, 2-lipped about ½-way down; tube narrow, constricted below the limb and then suddenly expanded upwards; upper lip ⅛ in. long, oblong, obtuse, notched at the apex; lower lip ¼ in. long, divided nearly to the middle into 3 obovate obtuse slightly crenulate lobes, the middle lobe the broadest. Stamens slightly exserted beyond the corolla-tube; filaments glabrous; anthers 2-celled, one of the cells rather higher up than the other. Ovary glabrous; style slightly pubescent. Capsules ⅕ in. long, ovoid, subacute, glabrous, grooved on the 2 sides, with scarious back, 2-seeded. Seeds large for the size of the capsule, ⅛ in. long, ovoid-oblong, rounded, densely clothed with long hygroscopic mucilaginous hairs. Fl. B. I. v. 4, p. 516; Grah. Cat. p. 160; Dalz. & Gibs. p. 191; Aitch. Pb. & Sind Pl. p. 112; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357; Watt, Dict. Econ. Prod. v. 4, p. 625.—Flowers: Oct.–Mar. VERN. *Bhuigend.*

KONKAN: Malabar Hill (Bombay), *Graham.* DECCAN: common, *Woodrow*; Poona, *Cooke*! S. M. COUNTRY: Gadag, *Kanitkar*!—DISTRIB. India (W. Peninsula).

2. **Lepidagathis mitis,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 226. Root perennial; stems short; branches diffusely spreading, subquadrangular, glabrous, often purple in age. Leaves sessile, 1–1¾ by ¼–½ in., linear-oblong, subacute or obtuse, lineolate above, more or less hairy on the nerves beneath, the margins usually ciliolate, base narrowed. Flowers in a globose head 2–3 in. in diam., at the base of the stem; bracts chaffy, ⅓ in. long, long-acuminate from a broadly ovate base, without a rigid spinous point, hairy on both surfaces and with densely ciliate margins; bracteoles as long as the bracts, membranous, lanceolate, acuminate, without a rigid spinous point, with a strong mid-nerve, the upper half of the margin very densely ciliate with long white hairs. Calyx 4-partite, hairy; the two outer segments exceeding ⅜ in. long; the lower divided about ½-way down into 2 lanceolate acute lobes; the inner lateral segments shorter and much narrower, all non-spinescent at the apex, the margins ciliate with long white hairs. Corolla ½–⅝ in. long, hairy, white outside, pale pink inside, copiously dotted with yellowish-brown spots, otherwise as in *L. cristata.* Stamens, ovary, style, and capsules as in *L. cristata.* Fl. B. I. v. 4, p. 516; Dalz. & Gibs. p. 191; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Nov.

KONKAN: *Stocks*! DECCAN: Phunda Ghát, *Dalzell*! S. M. COUNTRY: Belgaum in grass-jungles, *Ritchie*, 575!—DISTRIB. India (W. Peninsula).

3. **Lepidagathis trinervis,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 96. A small suffruticose diffuse plant; rootstock woody; branches numerous, 5–10 in. long, slender, quadrangular, with many nodes. Leaves 1–1¾ by ⅛–¼ in., sessile, linear, subacute, entire, glabrous or nearly so, the margins often scabrid, 3-nerved from a slightly tapering base, the midnerve stronger than the lateral ones which are close to the margin. Flowers in axillary sessile ovoid spikes ½–¾ in. long, usually 2 or more closely packed together so as to appear like a single head; bracts often colored, usually glabrous or nearly so, rather less than ½ in. long, ovate or ovate-elliptic, with a recurved cuspidate spine almost as long as the leafy part; bracteoles as long as the bracts, oblong-lanceolate, aristate-acuminate, membranous. Calyx membranous, ⅜ in. long, 5-partite (the lower lobes scarcely at all connate above the base) to about 1/16 in. from the base; the 3 outer segments nearly equal in length, the upper slightly broader, all lanceolate, very acute, not spinous-pointed, densely hairy inside, nearly glabrous outside; inner lateral segments shorter and narrower, linear, acute, hairy on both sides. Corolla densely hairy in bud with erect white hairs which project much beyond the apex of the bud, white, spotted with yellow, brown and purple, ¼–⅓ in. long; tube short; upper lip oblong, rounded at the apex; lower lip 3-lobed, the lobes obtuse, the lateral narrower than the middle one. Capsules ¼ in. long, ovoid-lanceolate, subacute, compressed, 2-seeded, grooved on the sides, the back scarious, irregularly rupturing. Seeds 1/10–⅛ in. long, oblong, rounded at the apex, clothed with long mucilaginous hygroscopic hairs many times longer than the nucleus. Fl. B. I. v. 4, p. 517; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Nov.–Feb.

Konkan: *Law!*, *Stocks!*; Karanja Island, Bombay Harbour, *Cooke!* Deccan: Pál jungles (Khandesh districts), *Kanitkar!* Gujarat: Perim Island at the mouth of the Narbada river, *Cooke!*; Deesa, *Stocks!*; Palanpur, *Raoji!*; Kathiawar, *Woodrow.* —Distrib. India (Central India, Chota-Nagpur, N.W. Himalaya, W. Peninsula).

Var. *asperrima*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1885) p. 517. Stem 6 in. high, stout, woody, much branched; internodes very short. Leaves small, ⅓ by 1/12 in., mucronate, very scabrous. *Lepidagathis asperifolia*, T. Anders. MS. in Herb. Kew.

There is one sheet in Herb. Kew. marked Konkan, *Stocks!* The plant should perhaps have specific rank accorded to it.

4. **Lepidagathis lutea,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 139. Rootstock woody; stems numerous, suberect, filiform, quadrangular, pubescent or nearly glabrous. Leaves sessile, usually 1–2 by 1/10–⅛ in. (in a specimen from Marmagão near the sea reaching 4 by ⅓ in.), linear, acute or subobtuse, glabrous or nearly so, 3-nerved, base slightly tapering. Flowers in velvety-pubescent spikes, 1–3 together in many of the axils and also in a subradical congested globe; bracts variable in length, ½–1¾ in. long, the outer herbaceous, long-acuminate from a broadly ovate base, softly hairy on both surfaces, 3-nerved, sharply spinous-pointed, ciliate, the inner bracts shorter, membranous, silky-hairy, usually spinous-pointed; bracteoles nearly ½ in. long, ovate or obovate, silky-hairy on both sides, spinous-pointed. Calyx rather less than ½ in. long, silky-hairy on both sides, 5-partite to about 1/12 in. from the base; segments thick; the outer upper segment ⅛ in. broad, slightly longer

than the 2 lower, ovate, acuminate, the 3 nerves from the base uniting at the apex and produced into a short spinous point; the lower segments somewhat oblanceolate, one of them usually broader than the other, both armed with a long spinous point nearly $\frac{1}{8}$ in. long; inner lateral segments very slightly longer than the lower, linear-lanceolate with a long spinous point, very densely silky-hairy. Corolla yellow, $\frac{1}{2}$ in. long; tube narrowly cylindric for about $\frac{1}{5}$ in., then abruptly and truncately expanded, the swollen part crenulate at the base; limb pubescent outside; upper lip short, $\frac{1}{16}$ in. long, rounded, entire or emarginate; lower lip $\frac{1}{6}$ in. long, reticulately veined, deeply 3-lobed, the lobes obtuse, the middle one crenulate, twice as broad as the lateral; palate furnished with 2 dense rows of hairs. Filaments very short, glabrous or nearly so; anther-cells slightly bearded. Ovary glabrous; style pubescent. Capsules $\frac{1}{4}$ in. long, ovoid-lanceolate, with scarious backs, 2-seeded. Seeds with very long hygroscopic mucilaginous hairs which are many times longer than the nucleus. Fl. B. I. v. 4, p. 517; Dalz. & Gibs. p. 190; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Nov.

KONKAN: Malwán, *Dalzell*!; Marmagão, *Woodrow*!; near Ratnagiri, *Kanitkar*!—DISTRIB. India (W. Peninsula).

5. **Lepidagathis clavata,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 340. Root woody, perennial; stems numerous, 6–15 in. high, erect, rarely branched, tetragonal, glabrous, usually naked below, marked with the scars of fallen leaves. Leaves rigid, coriaceous, sessile, $\frac{3}{4}$–1 by $\frac{1}{4}$–$\frac{3}{8}$ in., longitudinally folded (*complicate*), ovate-oblong, acuminate, decussate, more or less recurved at the apex, spinous-pointed, entire, glabrous, base rounded; main-nerves 4–5 pairs, conspicuous on both sides, very much so on the lower surface. Flowers in terminal, often purplish, 4-sided, hairy, usually simple spikes 1–2$\frac{1}{2}$ in. long (radical and axillary spikes rarely present; when present depauperate, imperfect, and non-floriferous); bracts quadrifarious, nearly $\frac{3}{4}$ in. long by $\frac{1}{4}$–$\frac{1}{3}$ in. wide, elliptic or slightly obovate, squarrosely spinous-pointed, softly hairy and ciliate with long white hairs, nerved from the base; bracteoles nearly $\frac{1}{2}$ in. long by $\frac{1}{16}$–$\frac{1}{8}$ in. broad, linear-lanceolate, densely hairy and ciliate with long silky white hairs. Calyx rather more than $\frac{1}{2}$ in. long, 4-partite to $\frac{1}{16}$ in. from the base; upper outer segment $\frac{1}{8}$ in. broad, slightly longer than the lower, oblong-lanceolate, 3-nerved, finely spinous-pointed; lower segment 2-lobed to about $\frac{1}{8}$–$\frac{1}{6}$ in. from the base, the connate portion easily separable, the lobes equal, $\frac{1}{10}$ in. broad, oblong-lanceolate, 3-nerved, finely spinous-pointed; inner lateral segments lanceolate-subulate, very acute, finely spinous-pointed, 1-nerved. Corolla rose-colored (*Dalzell*), $\frac{1}{2}$–$\frac{3}{4}$ in. long; upper lip broad, rounded, 2-toothed; lower lip 3-lobed, the lobes oblong obtuse, subequal, pubescent outside, the throat and palate spotted with yellow, glabrous. Capsules $\frac{3}{8}$ in. long, ovoid-lanceolate, acutely pointed, glabrous, 2-valved, 2-seeded, the back not scarious. Seeds $\frac{1}{5}$ by $\frac{1}{8}$ in., large for the size of the capsule, ovoid, acute, with short hygroscopic hairs. Fl. B. I. v. 4, p. 518; Dalz. & Gibs. p. 191; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Jan.

Rare. KONKAN: *Stocks*! S. M. COUNTRY: Chorla Ghát, *Dalzell*!—DISTRIB. India (W. Peninsula).

6. **Lepidagathis prostrata,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 138. A rigid prostrate undershrub; stems creeping and rooting near the base, obtusely quadrangular, glabrous, much-branched; young branches softly tomentose. Leaves small, sessile, rigid, subcomplicate, ¼–⅓ in. wide, rarely reaching 1 in. long, oblong-lanceolate, spinous-pointed, recurved, pubescent on both sides, base somewhat cuneate; main nerves 4–5 pairs. Flowers in simple, erect, softly pubescent spikes ½–2 in. long, usually terminal on short lateral ascending branches; bracts ½ in. long, oblong-obovate, glandular-pubescent, spinous-pointed, nerved, often purplish, ciliate; bracteoles ⅓ in. long, linear-lanceolate, spinous-pointed, glandular-pubescent. Calyx ⅜ in. long, 5-partite to within $\frac{1}{10}$ in. of the base, glandular-pubescent inside and outside; the 3 outer segments of nearly equal length, the upper 5–7-nerved, ovate-lanceolate, twice as broad as either of the other 2, which are lanceolate and 3-nerved, all 3 spinous-pointed and with ciliate margins; the 2 inner lateral segments much shorter and narrower, linear-lanceolate, acute, ciliate. Corolla ¾ in. long, pubescent outside, rose-colored or yellowish-white, deeply 2-lipped; upper lip ⅓ in. long, broad, rounded, shortly 2-toothed, marked with dark transverse lines; lower lip nearly ½ in. long, deeply divided into 3 subequal oblong spreading lobes; palate glabrous. Capsules ⅜ in. long, ovoid-lanceolate, compressed, glabrous, 2-valved, 2-seeded, the back not scarious. Seeds $\frac{1}{10}$ in. long, broadly ovoid, shortly hygroscopically hairy. Fl. B. I. v. 4, p. 518; Dalz. & Gibs. p. 190; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—*Flowers*: Dec.

Konkan: *Stocks!*; Malwán on bare rocks, *Dalzell!* Kanara: Mundele (N. Kanara), *Ritchie, 1946!*—Distrib. India (subtropical W. Himalaya, W. Peninsula).

7. **Lepidagathis rigida,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 341. An erect undershrub 3–4 ft. high, rigid, little-branched; stem quadrangular, slender, softly hairy with glandular and simple hairs. Leaves coriaceous, 2½–4½ by ¼–⅝ in., linear-lanceolate, acute, longitudinally folded (*complicate*), glandular-pubescent on both sides, base long-attenuate into an obscure petiole; main nerves 8–10 pairs, prominent. Flowers in dense glandular-hairy terminal cylindric simple or compound spikes 1–2½ in. long, on short lateral branches; bracts ⅜–½ by $\frac{1}{10}$ in., linear-lanceolate, acute, and, as well as the bracteoles, softly silky with simple and glandular hairs, 3-nerved, spinous-pointed; bracteoles ⅜ by $\frac{1}{16}$ in., linear-lanceolate, 1-nerved. Calyx 4-partite nearly to the base, densely silky with long simple and glandular hairs, rather less than ½ in. long to the top of the longest segment; upper outer segment ⅛ in. broad, elliptic-lanceolate, 3–5-nerved and reticulately veined; lower outer segment 2-lobed to about ⅛ in. from the base, the lobes $\frac{1}{12}$ in. wide, lanceolate, acute, 1- or sometimes obscurely 3-nerved; the 2 inner lateral segments scarcely $\frac{1}{20}$ in. wide, shorter than the others, linear-lanceolate, 1-nerved, all the segments finely spinescent. Corolla yellowish-white, spotted with brown or purple, pubescent outside; upper lip ⅕ in. long, broad, rounded, notched; lower lip ¼ in. long, 3-lobed, the lobes subequal, oblong, obtuse; palate glabrous. Filaments glabrous; anthers bearded. Ovary glabrous; style pubescent. Capsules ¼ in. long, ovoid-lanceolate, glabrous. Seeds $\frac{1}{10}$ in. long, ovoid, subacute, clothed with short hygroscopic hairs. Fl. B. I. v. 4, p. 518; Dalz. & Gibs.

p. 191; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Dec.–Mar.

KONKAN: *Lambert*!, *Stocks*!; W. Ghâts, *Woodrow*; Talkat Ghât, *Dalzell*! S. M. COUNTRY: Râmghât, *Dalzell*!, *Ritchie*, 1198! SIND: *T. Anderson*.—DISTRIB. India (W. Peninsula).

8. **Lepidagathis cuspidata,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 97. An erect undershrub 1–3 ft. high; stems and branches quadrangular, glabrous or glandular-pubescent upwards. Leaves of the main stem 2½–4½ by ¾–1¾ in., oblong-lanceolate, acute or acuminate, usually mucronate, glabrous or nearly so, base acute, cuneately tapering and decurrent into the petiole, sometimes nearly to its base; petioles ¼–1 in. long, often obscure; leaves of the branches ¾–1 by ⅜ in., subsessile, elliptic-lanceolate, usually softly pubescent, spinous-pointed. Flowers in terminal spikes often terminating short axillary branches; spikes very variable in size, shape, and density, sometimes 1 in. long, dense, sometimes 6 in. long, lax with distant flowers in opposite pairs; bracts ⅜–½ by ⅛–⅕ in., elliptic-oblong or obovate, acute, spinous-pointed, 3-nerved, and, as well as the bracteoles, glandular-hairy; bracteoles ⅛–⅜ in. long, linear-lanceolate, spinous-pointed, 1-nerved. Calyx ⅛ in. long to the top of the longest segment, glandular-hairy, almost 5-partite to within 1/10 in. of the base (the lobes of the lower segment very slightly connate); upper outer segments slightly the longest, ⅛–⅙ in. broad, oblong-lanceolate, subacute, spinous-pointed, 3–5-nerved, reticulately veined; the 2 shorter outer segments 1/12 in. wide, lanceolate, acute, spinous-pointed, 1–3-nerved, reticulately veined; inner lateral segments nearly as long as the shorter outer ones, 1/20 in. broad, linear, very acute. Corolla white with darker lines, ½–⅝ in. long, pubescent outside; upper lip 1/10–⅕ in. long, ovate, acute, entire or notched, and, as well as the throat, marked with dark transverse purplish lines; lower lip ⅛–¼ in. long, 3-lobed, the lobes rounded, the middle the broadest; palate glabrous. Filaments glabrous; anther-cells bearded. Ovary glabrous; style pubescent. Capsules ⅓ in. long, ovoid-lanceolate, acute, glabrous, 2-valved, 4-seeded. Seeds 1/10 in. long, nearly as broad as long, ovoid, compressed, rounded at the apex, hygroscopically hairy, especially on the margins, with hairs shorter than the nucleus. A very variable plant as to the size of the parts of the flower as well as the character of the spikes. Fl. B. I. v. 4, p. 519; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. —Flowers: Mar.

KONKAN: *Law*!, *Dalzell*!; Miradonger near Pen, *Stocks*!; Matheran, *Cooke*! DECCAN: Khandala, *Woodrow*!; Mahableshwar, *Cooke*!; Phunda Ghât, *Ritchie*, 1948! —DISTRIB. Throughout India.

9. **Lepidagathis calycina,** *Hochst. ex DC. Prodr.* v. 11 (1847) p. 252. A small erect rigid much-branched undershrub; branches woody, the young ones more or less pubescent. Leaves ½–¾ by ⅛–⅜ in., oblong-lanceolate, acute, glabrous or nearly so, narrowed and often unequal-sided at the base; petioles ⅛–⅙ in. long. Flowers numerous, in short spikes ½–¾ in. long, racemosely arranged along the branches; bracts 7/16 by ¼ in., elliptic-obovate, strongly mucronate, 3-nerved and reticulately veined, faintly ciliolate, soon becoming scarious; bracteoles ⅛–¼ in. long, linear-subulate. Calyx soon becoming scarious, nearly ½ in. long to the top of the longest segment, 4-partite almost to the base;

upper segment slightly the longest, $\frac{1}{8}$ in. wide, elliptic-lanceolate, acute, aristate, ciliolate, 3-nerved; lower segment 2-lobed to a little below the middle, the lobes lanceolate, acute, bristle-pointed, with a strong nerve near the inner margin of each lobe, reticulately veined, ciliolate; the 2 inner lateral segments linear-subulate, acute, 1-nerved, ciliolate. Corolla dingy-white, rather more than $\frac{1}{2}$ in. long, slightly pubescent outside; upper lip $\frac{1}{6}$ in. long, oblong, obtuse, 2-fid; lower lip $\frac{1}{8}$ in. long, divided about $\frac{1}{2}$-way down into 3 spreading subequal rounded lobes, the middle of the lip marked by purple spots (*Stocks*). Filaments glabrous. Ovary glabrous; style faintly pubescent. Capsules nearly $\frac{1}{3}$ in. long, 4-seeded (fide *C. B. Clarke*). Fl. B. I. v. 4, p. 519; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357; Aitch. Pb. & Sind Pl. p. 112. *Lepidagathis strobilifera*, Stocks, in Kew Journ. Bot. v. 4 (1852) p. 177.

SIND: *Stocks*!—DISTRIB. Beluchistan, Abyssinia.

10. **Lepidagathis incurva,** *D. Don, Prodr. Fl. Nep.* (1825) p. 119, VAR. **mucronata,** *C. B. Clarke.* A prostrate perennial herb; stems 1–2 ft. long, slender, obtusely quadrangular, pale, glabrous or nearly so. Leaves variable in size, 1–3 by $\frac{3}{4}$–$1\frac{3}{4}$ in. (in a specimen collected by Ritchie in N. Kanara the leaf including the petiole reaches 6 in. long), elliptic or elliptic-lanceolate, acute, lineolate, glabrous or pubescent, margins entire or obscurely crenulate, base tapering and decurrent into the petiole; main nerves 6–8 pairs; petioles $\frac{1}{2}$–1 in. long. Flowers in axillary and terminal 1-sided, often clustered, softly hairy spikes $\frac{1}{3}$–$\frac{3}{4}$ *in. long*; bracts $\frac{1}{4}$ by $\frac{1}{15}$ in., oblong-lanceolate, scarious, acute, spinous-pointed, softly hairy on the back, ciliate, 3-nerved; bracteoles $\frac{1}{5}$ by $\frac{1}{20}$ in. long, lanceolate, finely spinescent, ciliate, 1-nerved. Calyx $\frac{1}{5}$ in. long, 4-partite to about $\frac{1}{30}$ in. from the base, softly hairy with simple and gland-tipped hairs; segments equal in length or very nearly so; the upper of the 2 outer segments $\frac{1}{20}$ in. wide, lanceolate, acute, ciliate, 3-nerved; the lower 2-lobed to below the middle, the lobes lanceolate, hardly $\frac{1}{30}$ in. wide, ciliate; the 2 inner lateral segments linear-lanceolate, all the 5 lobes with very fine subspinous points. Corolla white, rather more than $\frac{1}{4}$ in. long, pubescent outside; tube not much inflated at the top, the narrow part $\frac{1}{8}$ in. long; upper lip $\frac{1}{8}$ in. long, suborbicular, slightly notched; lower lip $\frac{1}{6}$ in. long, 3-lobed rather less than $\frac{1}{2}$-way down, the lobes oblong, rounded at the apex, the middle one twice as broad as the lateral; palate glabrous. Filaments glabrous; anther-cells bearded. Ovary pubescent at the tip. Capsules $\frac{1}{5}$ by $\frac{1}{15}$ in., oblong-lanceolate, acute, pubescent at the tip, 4-seeded. Seeds $\frac{1}{30}$ in. long, broadly ovoid or suborbicular, shortly hygroscopically hairy. *Lepidagathis hyalina* var. *mucronata*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1885) p. 521. *Lepidagathis hyalina*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357 (*not* of Nees). *L. mucronata* (sp.), Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 95.—Flowers: Jan.–May.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks*! KANARA: *Stocks*!, *Woodrow*; Hatkumba, *Ritchie*, $\frac{1215}{2}$!; Kála naddi, *Ritchie*, 1215!—DISTRIB. India (W. Peninsula).

11. **Lepidagathis fasciculata,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 95. A diffuse weak herb; stems 1 ft. long, spreading, much-branched, slender, quadrangular, geniculate, softly hairy. Leaves often

in unequal pairs, 1–2½ by ½–1 in., ovate or elliptic, subacute, irregularly crenate or dentate, more or less softly pubescent on both sides, base cuneate, suddenly decurrent into the petiole; petioles ⅛–¼ in. long, softly hairy. Flowers few, in terminal often paniculately arranged leafy spikes; bracts ¼–½ by ⅛–⅕ in., ovate, acute, 3-nerved; bracteoles ¼ in. long, linear, both bracts and bracteoles hairy with simple and glandular hairs. Calyx ¼ in. long, 5-partite nearly to the base, softly hairy with simple and gland-tipped hairs; outer upper segment the longest, $\frac{1}{16}$ in. broad, linear-lanceolate not spinous- nor bristle-pointed, 3-nerved and reticulately veined, ciliate with long hairs; the two lower segments about $\frac{1}{20}$ in. broad, linear, very acute, 1-nerved and reticulately veined, ciliate; the 2 inner lateral segments shorter, subulate. Corolla rather less than ½ in. long, white, pubescent outside; narrow portion of the tube ⅛ in. long; upper lip short, $\frac{1}{10}$ in. long, 2-fid, spotted with purple (*Dalzell*); lower lip ⅕ in. long, 3-lobed, the lobes obtuse, the middle the longest; palate glabrous. Filaments glabrous; anther-cells, very slightly bearded, one attached much lower than the other. Ovary slightly hairy at the tip; style pubescent in the lower half. Capsules ¼ in. long, oblong-lanceolate, pubescent at the tip. Seeds $\frac{1}{20}$ in. in diam., suborbicular, shortly hygroscopically hairy. Fl. B. I. v. 4, p. 522; Nees, Monogr. Lepidag. (1841) p. 10; Trim. Fl. Ceyl. v. 3, p. 332; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Lepidagathis goensis*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 340; Dalz. & Gibs. p. 191.—Flowers: Feb.

KONKAN: *Stocks!*, *Dalzell!*; Goa districts at the foot of the Sahyadris, *Dalzell!*; Wari country, *Dalzell & Gibson*. S. M. COUNTRY: Rámghát, *Ritchie*, 592!—DISTRIB. Throughout Tropical and Subtropical India; Ceylon.

28. **HYPŒSTES,** R. Br.

Herbs or shrubs. Leaves entire, often with waved margins. Flowers axillary and terminal, usually clustered, running into terminal spikes or panicles; bracts longer than the calyx, oblong-lanceolate, 2 beneath each spikelet, free or connate at the base, each pair enclosing 1 perfect and 1 or 2 rudimentary flowers; bracteoles longer than the calyx. Calyx deeply 5-fid; segments narrow or setaceous, subequal. Corolla deeply 2-lipped; tube slender, dilated near the top. Stamens 2, attached below the throat; anthers 1-celled, muticous; pollen ellipsoid, longitudinally banded. Disk cupular. Ovary 2-celled; ovules 2 (rarely 1) in each cell; style shortly and equally 2-fid. Capsule oblong with a solid stalk, 4- or 2-seeded; placentas not rising elastically from the base of the capsule. Seeds smooth or rough, not hairy.—DISTRIB. Asia, Africa, and Australia; species 60.

1. **Hypœstes lanata,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 343. An undershrub; stems glabrous, geniculate, ascending. Leaves 3–6 by 1¼–2½ in., elliptic-lanceolate, acuminate, entire, glabrous or nearly so, base acute, decurrent along the petiole, sometimes nearly to the base. Inflorescence axillary and terminal, in woolly-tomentose elongate interrupted leafy spikes 6 in. long and upwards running into terminal panicles; flowers in clusters of 1–3 in the opposite axils of floral leaves; bracts 2, connate at the base, $\frac{7}{16}$ in. long, linear, subacute, densely

glandular-hairy; bracteoles $\frac{1}{3}$ in. long, linear, acute, glandular-hairy. Calyx pubescent, $\frac{1}{4}$ in. long, divided $\frac{2}{3}$ the way down; segments linear-subulate. Corolla light-purple (*Nairne*), 1 in. or more long, pubescent outside; tube slender below, slightly enlarged above; upper lip $\frac{5}{8}$ by $\frac{1}{8}$ in., ligulate, truncate, shortly emarginate, parallel-nerved; lower lip as long as the upper, $\frac{1}{3}$ in. broad, oblong, obtuse, shortly and equally 3-lobed, spotted with dark purple at the base. Filaments flat, hairy, purple; anthers yellow, 1-celled. Style filiform, glabrous; stigma 2-forked. Capsules $\frac{1}{2}$–$\frac{5}{8}$ in. long, with a long solid stalk, pubescent, narrowly clavate, pointed, 2-seeded. Seeds $\frac{1}{8}$ by $\frac{1}{12}$ in., oblong, rounded at the apex, tuberculate. Fl. B. I. v. 4, p. 557; Dalz. & Gibs. p. 197; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358.—Flowers: Oct.–Feb.

Rare. Konkan: *Law*!; hills in the Konkan, *Dalzell*!; Rohe (N. Konkan), *Dalzell & Gibson*.—Distrib. India (W. Peninsula).

29. **RUNGIA,** Nees.

Erect or diffuse herbs or undershrubs. Leaves entire. Flowers in terminal or axillary perfectly or imperfectly 1-sided spikes; bracts in 2 or 4 rows, 2 of the rows often barren, the flowering bracts often with scarious margins; bracteoles narrower than the bracts. Calyx small, 5-partite; segments linear-lanceolate. Corolla 2-lipped, the lower lip longer than the upper. Stamens 2; anthers 2-celled, the cells often superposed, the lower cell often with a white basal appendage. Disk annular or shortly cupular. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma minutely 2-fid. Capsule ovoid or oblong, shortly stipitate; placentas, together with the retinacula, elastically separating from the base of the capsule after dehiscence, to scatter the seeds. Seeds normally 4, compressed, orbicular, glabrous, minutely tubercular or verrucose, often with concentric furrows.—Distrib. Warmer parts of the world; species 20.

Bracts dimorphic; upper lip of corolla acute, not notched.	
Corolla $\frac{1}{2}$ in. long; barren bracts $\frac{3}{8}$–$\frac{1}{2}$ in. long	1. *R. crenata.*
Corolla $\frac{1}{4}$ in. long; barren bracts $\frac{1}{8}$ in long	2. *R. parviflora*, var. *pectinata.*
Bracts uniform; upper lip of corolla notched or emarginate.	
Spikes perfectly 1-sided; bracts herbaceous; corolla $\frac{1}{4}$ in. long.	3. *R. linifolia.*
Spikes imperfectly 1-sided; bracts with broad scarious margins; corolla exceeding $\frac{1}{4}$ in. long.	
Stems decumbent and rooting, nearly glabrous; capsules ovoid, acute	4. *R. repens.*
Stems erect, densely hairy; capsules obovoid, obtuse	5. *R. elegans.*

1. **Rungia crenata,** *T. Anders. in Journ. Linn. Soc.* v. 9 (1867) p. 518. An erect branched herb 1–1½ ft. high; stems and branches slender, terete or obscurely quadrangular, glabrous or nearly so. Leaves 1–2½ by $\frac{1}{2}$–1 in., elliptic-lanceolate, subacute, lineolate, sparsely hairy with hairs often bulbous-based, base acute; petioles $\frac{1}{4}$–$\frac{3}{8}$ in. long, hairy. Flowers in dense 1-sided spikes $\frac{3}{4}$–1 by $\frac{5}{8}$ in., terminal or axillary, sessile or pedunculate; bracts on one side of the spike, dimorphic, the barren bracts alternate, in 2 opposite rows, foliaceous, $\frac{1}{3}$–$\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., elliptic-oblong or somewhat obovate, densely softly hairy, strongly nerved,

mucronate, often with a narrow scarious margin on the lower edge reaching about ½-way up from the base, the fertile bracts ⅛ by $\frac{1}{10}$ in. (including the scarious margin), broadly obovate, mucronate, pubescent, with a broad scarious margin; bracteoles ⅛ in. long, elliptic-oblong, concave, pubescent, with scarious ciliolate margins. Calyx densely hairy, ⅛ in. long, divided nearly to the base; segments linear-lanceolate. Corolla blue, ½ in. long, hairy outside; upper lip rather less than ⅛ in. long, broadly ovate, acutely acuminate; lower lip nearly ⅛ in. long, obovate, with 3 short obtuse lobes, the middle lobe the narrowest. Filaments glabrous; lower cell of anthers with an obtuse white appendage. Capsules $\frac{1}{10}$–⅛ in. long, ovoid, acute, pubescent at the apex, compressed, the 2 flat faces scarious, the narrow edge hard, white, shining. Seeds $\frac{1}{20}$ by $\frac{1}{30}$ in., ellipsoid. Fl. B. I. v. 4, p. 547; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358.

Rare. KONKAN: *Stocks*!; Goa jungles, *Dalzell*! S. M. COUNTRY: Belgaum, *Ritchie*, 609! KANARA: *Law*!—DISTRIB. India (W. Peninsula).

2. **Rungia parviflora,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 110, VAR. **pectinata,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1885) p. 550. A much-branched annual straggling weed; stems subterete, glabrous or pubescent. Leaves very variable in size, ½–2½ by ⅛–1¼ in. (in a luxuriant specimen from Matheran 4 by 1½ in.), elliptic-lanceolate or oblong-lanceolate, acute or subobtuse, lineolate, glabrous or nearly so, base acute; petioles ⅛–½ in. long. Flowers in terminal and axillary 1-sided subsessile spikes ¼–1 in. long, sometimes 2 or 3 together at the ends of the branches; bracts dimorphic, the barren ⅛ by $\frac{1}{10}$ in., in 2 rows, lanceolate, cuspidate, pubescent, usually with scarious margins on both sides or sometimes on one side only, rarely not margined; fertile bracts ⅛ in. in diam. (including the broad scarious margin), hairy on both sides, orbicular, the central herbaceous portion lanceolate, cuspidate, the scarious margins often $\frac{1}{20}$ in. broad, usually 2-fid at the rounded apex; bracteoles $\frac{1}{10}$ in. long, elliptic-oblong, concave, with ciliate scarious margins which are 2-fid at the apex. Corolla blue, ⅛ in. long, pubescent outside; upper lip $\frac{1}{16}$ in. long, broadly ovate, acutely acuminate; lower lip $\frac{1}{10}$ in. long, obovate, shortly obtusely 3-lobed. Filaments glabrous; cells of the lower anthers with a long white appendage. Capsules $\frac{1}{10}$ by $\frac{1}{30}$ in., ovoid, acute, compressed, pubescent at the tip, with scarious faces, 2- or 4-seeded. Seeds when 2 about $\frac{1}{30}$ in., when 4 hardly $\frac{1}{50}$ in. in diam., orbicular, minutely echinulate, yellow. Trim. Fl. Ceyl. v. 3, p. 343; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358; Watt, Dict. Econ. Prod. v. 6, part 1, p. 592. *Rungia pectinata* (sp.), Nees, in DC. Prodr. v. 11, p. 470; Wight, Icon. t. 1547. *R. parviflora*, Dalz. & Gibs. p. 195. *R. polygonoides*, Nees, in Wall. Pl. As. Rar. v. 3, p. 110; Dalz. & Gibs. p. 196. *Justicia pectinata*, Linn. Amœn. Acad. v. 4, p. 299; Grah. Cat. p. 165.—Flowers: Nov.–Feb.

Very common. KONKAN: *Law*!; Ratnagiri, *Kanitkar*!; Marmagão, *Woodrow*!; Ambeghát, *Bhiva*!; Panvel, *Woodrow*; Matheran, *Cooke*! DECCAN: Panchgani Ghát, *Cooke*!; Khandala; *Woodrow*. KANARA: *Law*!; Kumpta, *Bhiva*!—DISTRIB. Throughout India; Ceylon.

VAR. *muralis*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 550. Spikes very dense, reaching 2 in. long and only ⅛ in wide; barren bracts ovate,

acute, hardly longer than the fertile. *R. muralis* (sp.), Nees, in DC. Prodr. v. 11, p. 470.

KONKAN: *Stocks*! KANARA: *Hohenhacker*!

3. **Rungia linifolia,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 110. A small suberect herb 6–12 in. high; stems very slender with almost filiform branches. Leaves ½–1 by ¼–½ in., elliptic-lanceolate, acute or subobtuse, lineolate, glabrous or nearly so, base usually tapering; main nerves 4–6 pairs; petioles 0–⅛ in. long. Flowers in narrow pedunculate terminal slender quadrifarious secund spikes ½–1½ in. long; bracts herbaceous, ⅛ by $\frac{1}{20}$ in., elliptic-lanceolate, acute, mucronate, minutely pubescent; bracteoles $\frac{1}{10}$ by $\frac{1}{40}$ in., linear-lanceolate. Calyx $\frac{1}{10}$ in. long, minutely pubescent, divided almost to the base; segments linear-subulate. Corolla pale-purple (*Ritchie*), ⅓ in. long, slightly pubescent outside; upper lip $\frac{1}{10}$ by $\frac{1}{12}$ in., bifid; lower lip ⅛ in. long, obovate, shortly 3-lobed. Filaments glabrous; lower cells of the anthers not or slightly appendiculate at the base. Capsules not seen. Fl. B. I. v. 4, p. 548; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Rostellularia gracilis*, Wight, Icon. t. 1541.—Flowers: Dec.

Rare. KONKAN: *Stocks*! KANARA: *Stocks*!, *Law*!, *Dalzell*!; Kála naddi, *Ritchie*, 1221!, *Woodrow*.—DISTRIB. India (W. Peninsula).

4. **Rungia repens,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 110. Stems usually decumbent, often rooting near the base, then erect, slender, subterete, glabrous or puberulous. Leaves 1–2 by ½–¾ in., subsessile or shortly petiolate, oblong-lanceolate, acute, lineolate on both sides, glabrous or nearly so, base usually tapering, less commonly rounded and unequal-sided; main nerves about 6 pairs; petioles rarely reaching ⅙ in. long. Flowers in erect terminal usually pubescent, imperfectly 1-sided spikes, 1–2½ in. long; bracts (including the scarious margin) ¼ by ⅕ in., broadly elliptic, pubescent (the herbaceous part inside the margin often lanceolate), cuspidate, much imbricate, the margins thinly scarious, ciliate, often $\frac{1}{16}$ in. wide; bracteoles ⅕ in. long, linear-lanceolate, acute, with scarious margins, minutely pubescent. Calyx ⅙ in. long, puberulous, divided to within $\frac{1}{25}$ in. of the base; segments lanceolate-subulate. Corolla white, blue, or pink, with darker spots, pubescent outside, nearly ½ in. long; upper lip ⅛ in. long, oblong, emarginate; lower lip ⅙ in. long, shortly 3-lobed. Lower anther-cells with a white appendage at the base. Capsules ⅙–⅕ in. long, ovoid-oblong, acute, compressed, with scarious faces and hard edges, pubescent. Seeds $\frac{1}{16}$ in. in diam., suborbicular, rugose with concentric furrows, pale-brown. Fl. B. I. v. 4, p. 549; Dalz. & Gibs. p. 196; Wight, Icon. t. 465; Trim. Fl. Ceyl. v. 3, p. 343; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358; Watt, Dict. Econ. Prod. v. 6, part 1, p. 593. *Justicia repens*, Linn. Sp. Pl. (1753) p. 15; Grah. Cat. p. 165.—Flowers: Nov.-Jan. VERN. *Ghátipitpápra*.

Common throughout the Presidency. KONKAN: *Stocks*! DECCAN: Panchgani, *Cooke*!; Khandala, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 607! KANARA: *Woodrow*.—DISTRIB. Throughout India; Ceylon.

5. **Rungia elegans,** *Dalz. & Gibs. Bo. Fl.* (1861) p. 196. An erect herb 6–15 in. high; stems somewhat angular, clothed with soft white hairs. Leaves sessile or very shortly petiolate, 1½–2¼ by ½–1½ in.,

elliptic-lanceolate, acute or acuminate, glabrous or nearly so, base usually rounded; *main nerves about 8 pairs, prominent beneath*; petioles 0–$\frac{1}{8}$ in. long. Flowers in sessile terminal imperfectly 1-sided spikes 1–2 in. long; bracts $\frac{3}{8}$ by $\frac{1}{4}$ in., hairy on both sides and with scarious margins, broadly elliptic, rounded at the apex, cuspidate, the central herbaceous portion of the bract lanceolate, the scarious margin $\frac{1}{10}$ in. broad, ciliate, sometimes tinged with pink; bracteoles $\frac{1}{8}$ by $\frac{1}{25}$ in., linear-lanceolate with scarious margins. Calyx $\frac{1}{8}$ in. long, divided to within $\frac{1}{20}$ in. of the base, pubescent; segments linear-subulate. Corolla of a fine blue, exceeding $\frac{1}{2}$ in. long, pubescent outside; upper lip $\frac{1}{8}$ in. long, oblong, notched; lower lip exceeding $\frac{1}{4}$ in. long, divided $\frac{1}{2}$-way down into 3 obtuse lobes. Filaments glabrous; lower cells of the anthers with white appendages. Ovary pubescent. Capsules $\frac{1}{6}$–$\frac{1}{5}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., obovoid-oblong, truncate, shortly mucronate, shortly narrowed at the base, pubescent on the sides and on the scarious faces. Seeds $\frac{1}{16}$ in. long, broadly oblong and rounded at the apex, or suborbicular, rugose with concentric furrows, yellow or brown. Fl. B. I. v. 4, p. 549; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Justicia repens* var. *villosa*, Nees, in DC. Prodr. v. 11, p. 472.—Flowers: Sept.–Jan.

Konkan: *Stocks!*; Salsette, *Nairne*. Deccan: Poona, *Cooke!*, *Woodrow!*; hills 4 miles W. of Poona, *Krishna!*; high hills round Junnar, *Dalzell & Gibson*; Panchgani Ghát, *Cooke!* Kanara: *Law!*—Distrib. India (W. Peninsula).

30. **DICLIPTERA,** Juss.

Diffuse or suberect herbs. Leaves ovate or elliptic, acute, entire or obscurely undulate. Flowers in axillary and terminal clusters or paniculate often umbel-like cymes, 1 or more enclosed within a pair of opposite involucral bracts, the flowers sessile within the bracts, one or more often reduced to a calyx and bracteoles; bracts exceeding the calyx, opposite, unequal, often connate at the base; bracteoles linear or linear-lanceolate, about equalling the calyx. Calyx deeply 5-partite; segments equal, linear-lanceolate, more or less pubescent. Corolla usually red, often spotted with purple; tube slender, slightly or not enlarged above; limb deeply 2-lipped, the upper lip entire or emarginate, the lower lip very shortly 3-lobed. Stamens 2; anthers 2-celled, usually superposed, rarely with basal appendages. Disk cupular. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma shortly 2-fid. Capsules ellipsoid, ovoid or obovoid, subsessile or with a short solid stalk; placentas separating elastically from the base of the capsule after dehiscence, to scatter the seeds. Seeds ovoid or suborbicular, verrucose, echinulate, tuberculate, or papillose.—Distrib. Tropical and subtropical regions of both hemispheres; species 60.

Tubercles on the seeds glochidiate.	
Corolla $\frac{1}{8}$ in. long; capsules pubescent at the apex; bracts $\frac{1}{16}$ in. broad	1. *D. micranthes.*
Corolla $\frac{3}{4}$ in. long; capsules pubescent all over; bracts nearly $\frac{1}{2}$ in. broad	2. *D. zeylanica.*
Tubercles on the seeds not glochidiate.	
Flowers in clusters; bracts lanceolate	3. *D. Leonotis.*
Flowers in terminal lax panicles; bracts obovate, cuneate	4. *D. cuneata.*

1. **Dicliptera micranthes,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 112. A more or less branched erect herb 6–18 in. high; branches

angular, usually glabrous. Leaves 1¾–3½ by ¾–1¾ in., ovate or elliptic, acuminate, lineolate, glabrous or nearly so; main nerves 5–6 pairs, slender; petioles ½–1½ in. long. Flowers in axillary clusters of usually 3–5, small sessile, sometimes umbel-like cymes; bracts herbaceous, veined, unequal, the longer of the pair ⅓ by $\frac{1}{16}$ in., oblong-obovate, cuspidately acuminate, nearly glabrous, the lower half of each bract with scarious densely ciliate margins, each pair of bracts enclosing usually 3 flowers very closely packed together; bracteoles ⅕ in. long, linear-lanceolate, hairy. Calyx ⅛–¼ in. long, hairy, 5-partite to about $\frac{1}{30}$ in. from the base; segments lanceolate-subulate, very acute. Corolla ⅕ in. long, pubescent outside; tube narrow, scarcely enlarged above; upper lip $\frac{1}{20}$ in. long; lower lip $\frac{1}{16}$ in. long. Capsules ⅙ by $\frac{1}{16}$ in., ellipsoid, compressed, subacute, very shortly stalked, pubescent at the apex, the sides glabrous, 4-seeded. Seeds $\frac{1}{30}$ in. in diam., orbicular, echinulate with small tubercles with stellately radiating tips. Fl. B. I. v. 4, p. 553; Dalz. & Gibs. p. 197; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358.—Flowers: Oct. VERN. *A'mphutavâni.*

KONKAN: Sâgargarh (N. Konkan), *Stocks!*, *Dalzell & Gibson.* GUJARAT: *Dalzell!*; Neriad, *Kanitkar!* SIND: Sâkhpur, *Woodrow.*—DISTRIB. India (Behar, Chota-Nagpur, Central India, W. Peninsula); Tropical Africa.

2. **Dicliptera zeylanica,** *Nees, in DC. Prodr.* v. 11 (1847) p. 474. A prostrate or subscandent herb; stems long, glabrous or hairy, or sometimes densely woolly; branches 4- or 6-sided. Leaves 1½–4½ by ¾–2½ in., ovate or elliptic, shortly acuminate, lineolate, glabrous or somewhat scabrid above, paler and more or less hairy on the nerves beneath, mucronate, base acute; petioles ⅛–⅝ in. long. Flowers in axillary and terminal umbel-like few-flowered sometimes clustered cymes, rarely reduced to a single head; peduncles of the cyme ¼–1 in. long; branches of the cyme very often 3, less commonly 4 or 5, usually short, pedicel-like, each supporting a pair of bracts which enclose 1–3 sessile flowers of which usually 1 only is fertile; bracts herbaceous, in opposite pairs, equal or unequal, connate at the base, broadly ovate, ½–¾ in. long and nearly as broad as long (occasionally reniform and broader than long), mucronate, more or less hairy on both sides, reticulately veined; bracteoles ¼ in. long, linear-subulate, very hairy. Calyx ¼ in. long, hairy, 5-partite to about $\frac{1}{12}$ in. from the base; segments lanceolate, very acute. Corolla deep-rose, often exceeding ¾ in. long, pubescent outside, deeply 2-lipped; tube slender below, slightly enlarged above; upper lip ⅜ in. long and as broad, obovate, entire; lower lip nearly ½ by ⅕ in., oblong, truncate, shortly 3-lobed, the lobes $\frac{1}{16}$ in. long, subequal, oblong, rounded. Filaments flat; one anther-cell attached much higher up than the other, the lower cells not appendaged at the base. Style filiform, more or less pubescent. Capsules ¼ in. long, obovoid, truncate or rounded, shortly mucronate, compressed and with a stalk about $\frac{1}{16}$ in. long, densely pubescent all over. Seeds $\frac{1}{10}$ in. in diam., compressed, minutely tubercular, the tubercles on the margins minutely glochidiate. Fl. B. I. v. 4, p. 552; Trim. Fl. Ceyl. v. 3, p. 344; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Dicliptera bivalvis,* Nees, l. c. p. 475 (*not* of Juss.); Wight, Icon. t. 1551; Dalz. & Gibs. p. 196. *Justicia bivalvis,* Grah. Cat. p. 164 (*not* of Linn.).—Flowers: Dec.–Mar.

Konkan: *Stocks*!, *Dalzell*!; S. Konkan, *Graham*, *Ritchie*, 585!; Matheran, *Cooke*! Deccan: Khandala, *Woodrow*!; Mahableshwar, *Cooke*! S. M. Country: Belgaum, *Ritchie*, 591!—Distrib. India (W. Peninsula); Ceylon.

3. **Dicliptera Leonotis,** *Dalz. MS. in Herb. Kew., ex C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1885) p. 553. Glabrous or nearly so; stem 6-angular, erect, 2–3 ft. high with elongate opposite branches. Leaves 2–3 by ¾–1 in., elliptic-lanceolate, glabrous or pubescent, attenuated at the base; petioles ⅓–½ in. long. Flowers in clusters of small subsessile somewhat umbel-like cymes in the opposite axils and at the ends of the branches; bracts in unequal pairs, the longer ½ by ⅛ in., lanceolate, acuminate cuspidate, pubescent, 3-nerved, the 2 lateral nerves close to the margin, without scarious margins in the lower part; bracteoles ⅜ by $\frac{1}{20}$ in., linear-lanceolate, very acute. Calyx ¼–⅓ in. long, divided to within $\frac{1}{16}$ in. of the base; segments linear-lanceolate, very acute. Corolla ⅝ in. long, pubescent outside; upper lip shorter than the lower, entire; lower lip ⅜ in. long, oblong, subtruncate, very shortly 3-lobed, the lobes scarcely $\frac{1}{20}$ in. deep. Capsules ¼ by ⅛ ⅙ in., obovoid, mucronate, much compressed, shortly stalked, with scarious faces, hairy all over, 4-seeded. Seeds $\frac{1}{16}$ by $\frac{1}{20}$ in., obovoid-oblong, rounded at the apex, with small not glochidiate tubercles. *Dicliptera Burmanni*, Dalz. & Gibs. p. 196 (*not* of Nees). *D. Roxburghiana*, Dalz. & Gibs. p. 196? (*not* of Nees).

Rare. Konkan; S. Konkan, *Nairne*. Deccan: Anjaniri hill above Trimbak near Nasik, *Dalzell*!—Distrib. Tropical Africa.

4. **Dicliptera cuneata,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 111. Stems branched, glabrous, terete or obscurely tetragonal. Leaves 1½–3 by ¾–1½ in., ovate or elliptic, acuminate, lineolate, glabrous, base acute or rounded; petioles ½–1½ in. long. Inflorescence in lax terminal panicles, the branches of the panicle ½–1½ in. long, 1 or often 2 from an axil, each bearing an umbel-like cyme of 3–8 heads, the branches of the cyme pedicel-like, 0–⅛ in. long; bracts below the cyme ⅛ in. long, lanceolate, acute; bracts of the flower-heads ⅓–½ by $\frac{1}{16}$–⅛ in., obovate-oblong, somewhat cuneate at the base, mucronate, hairy, ciliate, each pair of bracts enclosing 1 or more sessile flowers; bracteoles ¼–⅓ in. long, linear, very acute, pubescent. Calyx ⅕–¼ in. long, divided to about $\frac{1}{20}$ in. from the base; segments linear-subulate. Corolla rather more than ½ in. long, pubescent outside; upper lip ¼ in. long, obovate-oblong, entire; lower lip slightly longer than the upper, oblong, shortly 3-lobed, the lobes subacute. Filaments glabrous or sparsely hairy. Ovary glandular-pubescent. Capsules ¼–⅓ by $\frac{1}{10}$–⅛ in., with a stalk about $\frac{1}{12}$ in. long, compressed, obovoid, obtusely rounded or subtruncate and bluntly pointed at the apex, densely pubescent at the tip with short glandular hairs, less densely so on the sides and scarious faces, 4-seeded. Seeds somewhat obovoid, $\frac{1}{12}$ by $\frac{1}{16}$ in., compressed, tubercular, the tubercles not glochidiate. Fl. B. I. v. 4, p. 552; Wight, Icon. t. 1552; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358.—Flowers: Dec.–Jan.

Rare. Deccan: Mâwal, *Woodrow*; Jaronda hill, *Woodrow*. S. M. Country: Yellur hill near Belgaum, *Ritchie*, 594!—Distrib. India (W. Peninsula).

31. **ECBOLIUM,** Kurz.

Glabrous or hairy shrubs. Leaves entire, rather thick. Flowers numerous, in terminal spikes; bracts large, imbricate; bracteoles small, linear or lanceolate. Calyx 5-partite; segments linear. Corolla-tube very long and narrowly linear (in the Indian species); upper lip entire or 2-fid; lower lip 3-lobed. Stamens 2, without rudiments of others; anther-cells 2, linear, not spurred nor appendaged at the base, of nearly equal height. Ovary glabrous or hairy, 2-celled; ovules 2 in each cell; style filiform; stigma very shortly equally 2-fid. Capsule much flattened, on a solid stalk, 2-seeded; placentas not rising elastically from the base of the valves. Seeds (in the Indian species) large, much flattened, tubercular and scabrous, without hairs.—DISTRIB. Africa, Madagascar, Arabia, India; species 12.

1. **Ecbolium Linneanum,** *Kurz, in Journ. As. Soc.* v. 40 (1871) part 2, p. 75, VAR. **lætevirens,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1885) p. 545. A low shrub; branches erect, terete, thickened above the nodes, glabrous. Leaves 3½–7 by 1¼–2½ in., lanceolate or elliptic-lanceolate, acuminate, glabrous, shining and dark green above, paler beneath, base acute; main nerves about 6 pairs, slender, prominent beneath; petioles ¼–½ in. long. Flowers in terminal dense or lax nearly sessile spikes 2–8 in. long; bracts foliaceous, reaching ⅞ by ⅜ in., elliptic-lanceolate, acute, sometimes aristate, entire, tapering towards the base, pubescent and ciliate, reticulately veined; bracteoles ⅛ in. long, lanceolate, acute, hairy. Calyx ¼ in. long, hairy, divided to within $\frac{1}{12}$ in. of the base; segments linear-lanceolate, very acute. Corolla bluish-green, hairy outside (very densely so in bud), reaching 1¾ in. long; upper lip rather more than ⅜ in. long, narrowly linear from a triangular base, notched at the apex; lower lip ½ in. long, divided almost to the base into 3 lobes, the lateral lobes oblong, subacute, the middle lobe broader, oblong, obtuse. Filaments of the stamens hairy at the base; anthers $\frac{1}{10}$ in. long. Ovary pubescent at the very tip; style filiform, glabrous in the upper, pubescent in the lower part; stigma of 2 short divaricate lobes. Capsules nearly 1 in. long by ⅜ in. wide above the seeds, battledore-shaped, acutely pointed, pubescent all over; stalk about ⅜ in. long. Seeds ⅛ in. in diam., broadly ovoid, much compressed, white, covered with small acute tubercles, the basal notch very deep. *Ecbolium Linneanum,* Trim. Fl. Ceyl. v. 3, p. 341; Talb. Trees, Bomb. ed. 2, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Justicia Ecbolium,* Linn. Sp. Pl. (1753) p. 15 *in part*; Wight, Icon. t. 463; Dalz. & Gibs. p. 194. *Justicia lætevirens,* Vahl, Enum. v. 1, p. 118.—Flowers: Oct.–Jan. VERN. *Odu-játi*; *Ránaboli*; *Dháktaadulsa.*

KONKAN: Matheran, *Cooke*!, *H. M. Birdwood*; Karjat, *Bhiva*! DECCAN: Khandala, *Graham*; east of Phunda Ghát, *Ritchie*, 1197! S. M. COUNTRY: Castlerock, *Kanitkar*!—DISTRIB. India (W. Peninsula); Ceylon.

VAR. *dentata,* C. B. Clarke (*l. c.*). Bracts acuminate with irregularly dentate margins; spikes dense. *Justicia dentata,* Klein, ex Link, Jahrb. v. 1, Heft 3, p. 48.

KONKAN: *Law*!; island of Karanja in Bombay Harbour, *Woodrow*!

32. **JUSTICIA,** Linn.

Herbs or shrubs. Leaves entire. Flowers sessile or subsessile, in spikes or panicles (rarely solitary or clustered), usually small; bracts various; bracteoles narrow or obsolete. Calyx 5- or 4-partite; segments narrow. Corolla 2-lipped; tube equalling or shorter than the limb; upper lip 2-lobed or subentire; lower lip 3-lobed, the lobes imbricate in bud. Stamens 2; filaments often dilated; anthers 2-celled, one cell higher up than the other, the cells oblong or round, the lower always with a white basal appendage. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma shortly 2-fid. Capsule ovoid or ellipsoid, 4-seeded (except in the abnormal capsules of *J. heterocarpa*), sometimes seed-bearing from the base, sometimes contracted below into a solid stalk and seed-bearing at the apex. Seeds ovoid or suborbicular, more or less compressed, tubercular, scaly or glochidiate.—DISTRIB. All warm regions; species about 200.

Calyx 5-partite, segments subequal.
- Shrubs.
  - Stems erect; leaves reaching 9 in. long; corolla 1 in. long and upwards ..... 1. *J. montana.*
  - Stems decumbent; leaves reaching 3 in. long; corolla less than 1 in. long ..... 2. *J. Betonica,* var. *ramosissima.*
- Herbs.
  - Flowers 1–4-nate, axillary; capsules dimorphous ... 3. *J. heterocarpa.*
  - Flowers numerous in spikes; capsules not dimorphous.
    - Leaves less than 2 in. long.
      - Bracts lanceolate, white with green nerves ... 4. *J. trinervia.*
      - Bracts orbicular, green ..... 5. *J. glauca.*
    - Leaves exceeding 2 in. long; bracts ovate, glandular-pubescent ..... 6. *J. wynaadensis.*

Calyx 4-partite; corolla less than $\frac{1}{2}$ in. long.
- Sepals scarious, the midrib produced into a long arista ..... 7. *J. micrantha.*
- Sepals not scarious, not aristate.
  - Bracts and bracteoles shorter than the calyx; sepals minutely scabrous at the tip, elsewhere glabrous; corolla $\frac{1}{8}$ in. long ..... 8. *J. diffusa.*
  - Bracts and bracteoles as long as or longer than the calyx.
    - Bracts linear, obtuse, glabrous; sepals similar to the bracts, glabrous; corolla reaching $\frac{1}{3}$ in. long ..... 9. *J. quinqueangularis.*
    - Bracts elliptic, subacute, $\frac{1}{16}$–$\frac{1}{12}$ in. broad, clothed with glistening jointed hairs; sepals hairy ... 10. *J. simplex.*
    - Bracts linear-lanceolate, hairy, $\frac{1}{25}$ in. broad ..... 11. *J. procumbens.*

1. **Justicia montana,** *Wall. Cat.* (1828) 2471 (*not* of Roxb.). Shrubby, 2–3 ft. high; stem erect, subtetragonal, nearly glabrous. Leaves 6–10 by 2–3½ in., elliptic-lanceolate, acute, glabrous, base attenuated into the petiole; main nerves 9–11 pairs, slender, arcuate, prominent beneath; petioles $\frac{3}{4}$–1 in. long. Flowers white, clustered, in large terminal paniculate sometimes thyrsoid spikes or racemes 6–15 in. long, the lower clusters of flowers often distant; bracts $\frac{1}{4}$ by $\frac{1}{8}$ in., ovate-oblong, puberulous; bracteoles $\frac{1}{8}$ in. long, elliptic; pedicels 0–$\frac{1}{8}$ in. long. Calyx $\frac{1}{4}$ in. long, pubescent, 5-partite to within $\frac{1}{16}$ in. of the

base; segments linear-lanceolate, acute. Corolla 1 in. long, pubescent outside, 2-lipped more than ½-way down; upper lip $\frac{5}{8}$ in. long, oblong, notched; lower lip 3-lobed; tube hairy within below the insertion of the filaments. Filaments glabrous except at their insertion which is densely hairy; lower anthers with a long acute white spur. Ovary pubescent. Capsules 1 in. long, clavate, pubescent, 4-seeded near the top. Seeds $\frac{1}{6}$ in. in diam., suborbicular, labyrinthically rugose, glabrous. Fl. B. I. v. 4, p. 525; Talb. Trees, Bomb. ed. 2, p. 264; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Hemichoriste montana*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 102; Dalz. & Gibs. p. 194; Wight, Icon. t. 1538.—Flowers: Jan.–Feb.

Dalzell without locality in Herb. Kew.! KONKAN: *Law*!, *Stocks*!; Ghâts, *Dalzell & Gibson*. DECCAN: Phunda Ghât, *Ritchie*, 1951! KANARA: Deviman Ghât, *Kanitkar*!; Yacombi, *Woodrow*.—DISTRIB. India (W. Peninsula).

2. **Justicia Betonica,** *Linn. Sp. Pl.* (1753) p. 15, VAR. **ramosissima,** *C. B. Clarke, in Hook. f. Fl. B. Ind.* v. 4 (1885) p. 525. A diffusely branched more or less decumbent undershrub, 2–4 ft.; stem cylindric, striate, with swollen nodes, often tinged with purple above the nodes. Leaves 2–4 by $\frac{3}{4}$–$1\frac{3}{4}$ in., ovate, acute or acuminate, light green, glabrous, entire, subcrenulate or slightly toothed, glabrous; main nerves about 6 pairs; petioles 0–$\frac{1}{4}$ in. long. Flowers in terminal (rarely axillary) spikes, often at the ends of short lateral branches, the spikes simple or paniculately branched, 1–5 in. long; bracts reaching $\frac{5}{8}$ by $\frac{1}{4}$ in., ovate, acute, mucronate, membranous, white with green veins, glabrous; bracteoles more than $\frac{1}{2}$ in. long by $\frac{1}{5}$ in. wide, lanceolate, acute, unequal-sided, somewhat falcately curved, thinly membranous, white with green veins, faintly ciliolate, otherwise glabrous. Calyx $\frac{1}{5}$ in. long, pubescent, 5-partite to within $\frac{1}{16}$ in. from the base; segments linear-lanceolate, very acute. Corolla $\frac{1}{2}$ in. long, pubescent outside, dull-white or pale-pink, 2-lipped about ½-way down; upper lip erect, emarginate; lower lip deflexed, 3-lobed, the lobes deep, oblong, rounded, subequal. Stamens conniving under the upper lip; filaments hairy at their insertion, otherwise glabrous; lower anther-cells with a long acute spur. Style pubescent. Capsules $\frac{3}{8}$ by $\frac{1}{4}$ in., softly pubescent, broadly clavate, with a short solid stalk, 4-seeded in the upper half, protuberant above the seeds. Seeds $\frac{1}{8}$ in. in diam., suborbicular, with a blunt ridge in the middle of one face, densely tuberculately rugose when wetted, the tubercles often 3–4-angular. Talb. Trees, Bomb. ed. 2, p. 265; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Justicia ramosissima*, Roxb. Fl. Ind. v. 1, p. 129; Grah. Cat. p. 165. *Adhatoda ramosissima*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 103; Dalz. & Gibs. p. 193.—Flowers: Oct.–Dec.

KONKAN: Matheran, *Cooke*!, *H. M. Birdwood*; Ghâts, *Dalzell & Gibson*. DECCAN: hills east of Mahableshwar, *Graham*; hills below Mahableshwar, *Cooke*!; Khandala, *Cooke*!, *Woodrow*!; Sangameshwar, *Woodrow*; north of Poona, *Woodrow*! S. M. COUNTRY: Gokak, *Cooke*!—DISTRIB. Throughout India.

3. **Justicia heterocarpa,** *T. Anders. in Journ. Linn. Soc.* v. 7 (1864) p. 41. A slender annual herb 6–12 in. high; stems minutely grey-pubescent. Leaves ½–$1\frac{1}{4}$ by $\frac{1}{4}$–$\frac{5}{8}$ in., ovate or ovate-lanceolate, acute, thin, minutely lineolate, glabrous or more or less pubescent, base

usually rounded; main nerves 4–5 pairs; petioles $\frac{1}{2}$–1 in. long. Flowers small, in close axillary clusters of 2–4 flowers; bracts minute. Calyx $\frac{1}{8}$ in. long, 5-partite nearly to the base, hairy; segments linear-subulate, ciliate. Corolla $\frac{1}{5}$ in. long, pubescent outside; upper lip about $\frac{1}{16}$ in. long, oblong, obtuse, rounded, 2-fid; lower lip slightly longer than the upper, broadly obovate or subquadrate, shortly 3-lobed. Capsules dimorphous; normal capsules $\frac{1}{8}$–$\frac{1}{5}$ in. long, ellipsoid, acutely pointed, pubescent at the top, 4-seeded with scarcely any stalk; abnormal capsules 1-celled, 1-seeded, $\frac{1}{8}$ in. long, ellipsoid with 3–6 vertical pectinate wings, the teeth of which are densely hairy. Seeds of the normal capsules $\frac{1}{30}$ in. in diam., tuberculate, glabrous; seeds of the abnormal capsules ovoid, larger than in the normal, nearly smooth, on a nearly basal retinaculum (*C. B. Clarke*). Fl. B. I. v. 4, p. 531; Aitch. Pb. & Sind Pl. p. 113; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Oct.–Nov.

GUJARAT: Deesa, *Stocks*, 74!; Porbandar (Kathiawar), *Woodrow*. SIND: Jemadar ka Landa near Karachi, *Stocks*, 74!—DISTRIB. India (Panjáb); Tropical Africa.

4. **Justicia trinervia,** *Vahl, Enum.* v. 1 (1805) p. 156. A small procumbent herb with a woody rootstock; stems glabrous, from a few inches to 1–2 ft. long. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ by $\frac{1}{4}$–$\frac{3}{8}$ in., the upper sessile, the lower shortly petiolate, elliptic or oblong or obovate-oblong, obtuse. Flowers in continuous somewhat lax glabrous spikes 1–5 in. long; bracts $\frac{7}{16}$ by $\frac{1}{8}$ in., white with green veins, lanceolate, acute, glabrous, sometimes ciliolate near the base; bracteoles exactly as the bracts. Calyx $\frac{1}{5}$ in. long, pubescent, divided to within $\frac{1}{30}$ in. of the base; segments lanceolate, very acute, 3-nerved (sometimes obscurely). Corolla $\frac{3}{8}$ in. long, pubescent outside; upper lip $\frac{1}{5}$ in. long, broadly ovate, concave, obtuse, 2-fid at the apex; lower lip $\frac{1}{4}$ in. long, deeply 3-lobed, the lobes obtuse, the middle twice as broad as the lateral ones. Filaments glabrous above, slightly pubescent at the very base. Style pubescent. Capsules $\frac{1}{2}$ by $\frac{1}{5}$ in., oblong-clavate, shortly pointed, pubescent, 4-seeded. Seeds $\frac{1}{8}$ in. in diam., densely clothed with acute tubercles. Fl. B. I. v. 4, p. 526; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Adhatoda trinervia*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 103; Dalz. & Gibs. p. 194.—Flowers: Oct.–Jan. VERN. *Sut.*

KONKAN: *Stocks!, Nairne*; Vingorla, *Dalzell!*; Wagdonger near Vingorla, *Dalzell & Gibson*; Matheran, *H. M. Birdwood*; Mahableshwar, *Nairne, Woodrow*. KANARA: Waguli (N. Kanara), *Ritchie*, 608!—DISTRIB. India (W. Peninsula).

VAR. *arenaria*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1885) p. 526. Leaves narrowly linear-oblong; spikes often small. *Adhatoda arenaria*, Nees, in DC. Prodr. v. 11, p. 387. Seems scarcely more than a form growing in stony arid ground.

S. M. COUNTRY: arid stony hill N.E. of Belgaum, *Ritchie*, 1146!

5. **Justicia glauca,** *Rottler, in Ges. Naturf. Fr. Neue Schr.* v. 4 (1802) p. 219. A branched diffuse herb 6–20 in. high; stems puberulous, the internodes long. Leaves 1–$1\frac{3}{4}$ by $\frac{3}{4}$–1 in., ovate, subacute, more or less pubescent, base usually rounded; main nerves 4–6 pairs; petioles $\frac{1}{3}$–$\frac{5}{8}$ in. long. Flowers in spikes 1–4 in. long, terminal or from the upper axils (solitary ebracteate flowers sometimes scattered in the

distant lower axils); bracts ¼ in. in diam., orbicular, ciliate with glandular hairs, more or less pubescent, shortly stalked; bracteoles very small, $\frac{1}{16}$ in. long, lanceolate, acute, pubescent. Calyx ⅕ in long, pubescent, divided to within about $\frac{1}{30}$ in. of the base; segments lanceolate, acute, ciliate. Corolla ⅓ in. long; tube ⅜ in. long, narrowly infundibuliform; upper lip ⅕ in. long, ovate-oblong, obtuse, notched, strongly nerved, spotted with purple; lower lip nearly ¼ in. long by ⅕ in. wide, broadly obovate, truncate at the apex and divided into 3 short subimbricate rounded lobes hardly $\frac{1}{20}$ in. deep; palate with 2 transversely plicate ridges. Filaments hairy at their insertion on the corolla-tube, otherwise glabrous. Ovary pubescent at the very tip; style pubescent below. Capsules ⅓ by ⅛ in., oblong, pointed, swollen above the seeds, glabrous except at the tip, which is faintly pubescent, 4-seeded; stalk $\frac{1}{16}$ in. long. Seeds $\frac{1}{10}$ in. in diam., densely clothed with somewhat triangular acute tubercles. Fl. B. I. v. 4, p. 529; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.—Flowers: Aug.–Oct.

Rare. KONKAN: *Stocks*! S. M. COUNTRY: Badami, *Cooke*!, *Woodrow*!, *Bhiva*!—DISTRIB. India (W. Peninsula).

6. **Justicia wynaadensis,** *Heyne, in Wall. Cat.* (1828) 2474. Suffruticose; stems elongate with distant nodes, slender, terete, striate, glabrous or nearly so. Leaves 2½–4½ by 1–1¾ in., elliptic or elliptic-lanceolate, acuminate, densely lineolate, glabrous or pubescent on the nerves beneath, base acute, rarely rounded; main nerves 6–8 pairs, slender, prominent beneath; petioles ¼–¾ in. long. Flowers solitary, opposite, along a glandular-hairy rhachis, in elongate drooping interrupted axillary and terminal spikes 2–4 in. long; bracts ⅛–¼ in. long by $\frac{1}{16}$ in. wide, ovate, acute, and, as well as the bracteoles and calyx, glandular-pubescent; bracteoles a little below the calyx ⅛ in. long, linear-lanceolate, acute. Calyx ⅕ in long, divided to within about $\frac{1}{30}$ in. of the base; segments linear-lanceolate, acute. Corolla pubescent outside, rose-colored, rather more than ⅜ in. long; upper lip ⅕ in. long, oblong, obtuse, concave, slightly notched, nerved; lower lip very slightly longer, with 3 obtuse lobes about $\frac{1}{16}$ in. deep, the middle lobe the broadest; palate with transverse dark bands spreading on each side of the midnerve. Filaments hairy below, glabrous above. Ovary hairy; lower half of style pubescent. Capsules ⅝ by ⅛ in., densely hairy, gradually narrowed into a stalk ¼ in. long, acutely mucronate, 4-seeded. Seeds $\frac{1}{10}$ in. in diam.; rugose with small obtuse tubercles. Fl. B. I. v. 4, p. 533; Talb. Trees, Bomb. ed. 2, p. 265; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357. *Adhatoda wynaadensis,* Nees, in DC. Prodr. v. 11, p. 406; Dalz. & Gibs. p. 194.—Flowers: Nov.–Dec.

Dalzell without locality in Herb. Kew.! KONKAN: *Dalzell & Gibson*; Marmagão, *Woodrow*! DECCAN: hills about Pár, below Mahableshwar, *Dalzell*! S. M. COUNTRY: Belgaum, *Ritchie*, $\frac{593}{2}$. KANARA: N. Kanara Ghâts in evergreen forests, *Talbot.*—DISTRIB. India (W. Peninsula).

7. **Justicia micrantha,** *Heyne, ex Wall. Cat.* (1828) 2449. A low much-branched herb 4–10 in. high; stems and branches slender, grooved, glabrous or pubescent, the younger branches sometimes retrorsely hairy. Leaves ¾–1½ by ½–⅝ in., ovate or elliptic, subobtuse, densely lineolate, sparsely hairy above, more densely so on the nerves

beneath with short stout hairs; main nerves 4–6 pairs; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long. Flowers in terminal and axillary dense spikes $\frac{1}{4}$–$1\frac{1}{4}$ in. long; bracts $\frac{1}{4}$ by $\frac{1}{16}$ in., linear, blunt, with scarious margins near the base, sparsely hispid with white long bristly hairs, often tipped with divaricate bristles; bracteoles similar to the bracts. Calyx $\frac{1}{5}$ in. long, 4-partite almost to the base; segments $\frac{1}{20}$ in. broad (twice as broad as the bracteoles), scarious, the midrib green, excurrent into a long blunt arista which is hispid with long white bristly hairs, and often with 2 divaricate bristles at the apex, the rest of the calyx glabrous or nearly so. Corolla $\frac{1}{4}$ in. long, pale-purple; upper lip $\frac{1}{8}$ in. long, deltoid-oblong, obtuse, entire; lower lip $\frac{1}{6}$ in. long, broadly obovate, with 3 rounded subequal lobes about $\frac{1}{20}$ in. deep. Filaments glabrous. Ovary pubescent at the tip; lower half of style pubescent. Capsules $\frac{1}{6}$ by $\frac{1}{12}$ in., tapering into a short stalk about $\frac{1}{20}$ in. long, subobtuse, mucronate, and with a few hairs at the apex, otherwise glabrous or sometimes with a few scattered hairs along the valves, 4-seeded. Seeds $\frac{1}{20}$ in. in diam., finely rugose (scarcely concentrically so). Fl. B. I. v. 4, p. 536; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Rostellaria crinita*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 101; Dalz. & Gibs. p. 193 (by error *Rostellularia*).—Flowers: Aug.–Oct.

KONKAN: Vingorla, *Dalzell & Gibson, Woodrow.* DECCAN: *Woodrow*!; Poona, *Cooke*!, *Woodrow*!; Panchgani, *Raoji*!—DISTRIB. India (W. Peninsula).

8. **Justicia diffusa,** *Willd. Sp. Pl.* v. 1 (1797) p. 87. Stems 1–2 ft. high, somewhat woody below, much-branched, subquadrangular. Leaves 1–$1\frac{3}{4}$ by $\frac{1}{2}$–$\frac{3}{4}$ in., ovate-elliptic or elliptic-lanceolate, acute or acuminate, more or less lineolate, glabrous, base usually acute; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers in axillary and terminal narrow spikes 1–6 in. long by $\frac{1}{5}$ in. or less wide; bracts shorter than the calyx, $\frac{1}{16}$ in. long, ovate, acuminate, with scarious margins, minutely scabrous at the tip, otherwise glabrous; bracteoles as long as and similar to the bracts but narrower. Calyx $\frac{1}{8}$ in. long, 4-partite nearly to the base; segments with scarious margins, lanceolate, acute, unequal, minutely scabrous at the tip. Corolla $\frac{1}{6}$ in. long, pale-purple, slightly pubescent outside; upper lip $\frac{1}{10}$ in. long, the lower portion ovate, the apical part subquadrate, subtruncate and slightly notched at the apex; lower lip very slightly longer than the upper, nearly as broad as long, very slightly 3-lobed at the rounded apex. Filaments glabrous except at their insertion. Ovary glabrous; lower part of style pubescent. Capsules $\frac{1}{6}$–$\frac{1}{5}$ in. long, shortly pointed, oblong, grooved on the back, glabrous, the solid stalk scarcely $\frac{1}{20}$ in. long. Seeds $\frac{1}{25}$ in. long, subconcentrically rugose. Fl. B. I. v. 4, p. 538; Trim. Fl. Ceyl. v. 3, p. 338; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Rostellaria diffusa*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 100; Dalz. & Gibs. p. 193 (by error *Rostellularia*).—Flowers: Oct.–Dec.

Common in pastures, *Dalzell & Gibson.* DECCAN: *Woodrow*!; Poona, *Cooke*!, *Woodrow*! SIND: *Cooke*!—DISTRIB. India (Panjáb, W. Peninsula, Rangoon); Ceylon, Siam.

VAR. 1. *prostrata*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1885) p. 538. Stems prostrate, intricately branched, patently hairy. Leaves

smaller, broadly elliptic or suborbicular, $\frac{1}{4}$–$\frac{1}{2}$ in. in diam. Spikes shorter and more dense; bracteoles and sepals broader. Capsules smaller, hairy. Trim. Fl. Ceyl. v. 3, p. 338.

Dalzell without locality in Herb. Kew.!

Var. 2. *Vahlii*, C. B. Clarke, l. c. Leaves narrowly lanceolate or linear; bracts lanceolate. *Rostellaria Vahlii*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 102.

Stocks without locality in Herb. Kew.!

9. **Justicia quinqueangularis,** *Koen. ex Roxb. Hort. Beng.* (1814) p. 80. A slender herb reaching 20 in. high; stems 4-5-angular with distant internodes, geniculate, glabrous. Leaves 1–3 by $\frac{1}{8}$–$\frac{3}{8}$ in., linear-oblong or linear-lanceolate, subobtuse, slightly lineolate, glabrous; petioles 0–$\frac{1}{8}$ in. long. Flowers in slender elongate glabrous terminal spikes 1–5 in. long; bracts $\frac{1}{6}$ by $\frac{1}{20}$ in., linear, obtuse, glabrous, and, as well as the bracteoles and calyx, with scarious margins; bracteoles as long as and similar to the bracts but narrower. Calyx glabrous, $\frac{1}{6}$ in. long (as long as the bracts and bracteoles), 4-partite nearly to the base (no 5th segment present rudimentary or otherwise); segments slightly broader than the bracteoles, linear, obtuse. Corolla nearly $\frac{3}{8}$ in. long, glabrous or nearly so outside, rose-colored; upper lip $\frac{1}{6}$ in. long, ovate, obtuse, 2-fid; lower lip $\frac{1}{5}$ in. long and as broad as long, suborbicular, very shortly 3-lobed, the lobes scarcely $\frac{1}{30}$ in. deep, rounded, overlapping. Filaments glabrous. Ovary glabrous. Capsules $\frac{1}{3}$ by $\frac{1}{10}$ in., oblong, acutely pointed, slightly narrowed into a stalk $\frac{1}{12}$ in. long, glabrous, 4-seeded. Seeds $\frac{1}{16}$ in. in diam., reticulately rugose. Fl. B. I. v. 4, p. 536; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358.—Flowers: Sept.–Oct.

S. M. Country: Belgaum, *Ritchie*, 1150!; Badami, *Woodrow*.—Distrib. India (Bengal, Central India, W. Peninsula).

Var. *peploides*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1885) p. 537. Leaves oblong or elliptic-oblong, obtuse, reaching 1 in. broad; petioles reaching $\frac{3}{8}$ in. long; spikes shorter and broader. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Rostellaria peploides*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 101; Dalz. & Gibs. p. 193 (by error *Rostellularia*).—Flowers: Oct.–Apr.

Konkan: *Stocks*! Deccan: about watercourses, *Dalzell & Gibson*; Poona, *Woodrow*!, *Kanitkar*!—Distrib. India (Panjáb, Bengal, Central India, W. Peninsula).

10. **Justicia simplex,** *D. Don, Prodr. Fl. Nep.* (1825) p. 118. A slender branched herb 6–20 in. high, variable under differing conditions of soil and climate; branches quadrangular, grooved, more or less hairy. Leaves 1–2 by $\frac{1}{2}$–1 in., ovate or elliptic-oblong, subobtuse, strongly lineolate, glabrous or hairy, base usually acute; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long. Flowers in dense terminal and axillary spikes 1–4 in. long; bracts $\frac{1}{5}$–$\frac{1}{6}$ by $\frac{1}{16}$–$\frac{1}{12}$ in., elliptic, subacute, hairy, the margins scarious and ciliate with many-jointed hairs; bracteoles as long as the bracts but narrower (about $\frac{1}{20}$ in. broad), lanceolate or somewhat obovate, hairy and with scarious and ciliate margins. Calyx $\frac{1}{3}$–$\frac{1}{5}$ in. long, hairy, divided almost to the base; segments subequal, or 1 sometimes a little longer than the

others, linear, subacute, narrower than the bracteoles, the margins scarious and densely ciliate. Corolla pubescent outside, $\frac{1}{5}$–$\frac{1}{3}$ in. long; tube about equalling the limb; upper lip ovate and concave in the lower, subquadrate in the apical part, subtruncate or rounded, 2-fid; lower lip suborbicular, with 3 very short rounded lobes. Filaments glabrous except at their insertion. Ovary pubescent at the tip; lower part of style pubescent. Capsules $\frac{1}{3}$–$\frac{1}{4}$ by $\frac{1}{20}$ in., oblong, obtuse, scarcely mucronate, pubescent at the apex, often slightly constricted between the seeds; solid stalk $\frac{1}{30}$ in. long. Seeds $\frac{1}{25}$ in. in diam., concentrically rugose. Fl. B. I. v. 4, p. 539; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358.—Flowers: Nov.–Dec.

Dalzell without locality in Herb. Kew. KONKAN: *Stocks*! S. M. COUNTRY: Belgaum, *Ritchie*, 604! KANARA: Yellur, *Ritchie*, $\frac{604}{2}$! GUJARAT: *Dalzell*!; Palanpur, *Woodrow*!; Rajkote (Kathiawar), *Woodrow*! SIND: *Dalzell*!, *Stocks*!, *Cooke*!—DISTRIB. India (Kashmir, Central India, Bengal, W. Peninsula); Abyssinia, Malay Islands.

VAR. *serpyllifolia*, Benth. ex C. B. Clarke, in. Hook. f. Fl. B. I. v. 4 (1885) p. 539. Very small; leaves $\frac{1}{2}$ in. in diam., elliptic or suborbicular, obtuse or subacute; spikes 1 by $\frac{1}{6}$ in.; bracts $\frac{1}{16}$–$\frac{1}{12}$ in. long, elliptic or broadly lanceolate, fulvous-hirsute. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358.—Flowers: Nov.–Dec.

S. M. COUNTRY: Badami, *Woodrow*. KANARA: *Woodrow*.—DISTRIB. India (W. Peninsula).

11. **Justicia procumbens,** *Linn. Sp. Pl.* (1753) p. 15. Stems diffuse, slender, with many divaricate branches, rooting at the lower nodes, glabrous or pubescent. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ by $\frac{1}{4}$–$\frac{3}{4}$ in., variable, elliptic or ovate, or lanceolate, usually obtuse at both ends, softly pubescent on both sides; petioles $\frac{1}{8}$–$\frac{1}{2}$ in. long. Flowers in rather dense cylindric terminal spikes $\frac{1}{2}$–$1\frac{1}{2}$ in. long; bracts $\frac{1}{5}$ by $\frac{1}{25}$ in., linear-lanceolate, acute, hairy, with scarious ciliate margins; bracteoles similar to the bracts. Calyx $\frac{1}{6}$ in. long, divided almost to the base; segments linear-subulate, narrower than the bracteoles, with scarious ciliate margins. Corolla pale violet-pink, $\frac{1}{4}$ in. long; tube about equalling the limb, funnel-shaped; upper lip broadly ovate and concave in the lower, narrowly subquadrate in the apical part, notched; lower lip very shortly 3-lobed. Filaments glabrous. Ovary glabrous. Capsules $\frac{1}{6}$ by $\frac{1}{16}$ in., oblong, shortly pointed, often constricted between the seeds, pubescent at the tip; solid stalk $\frac{1}{20}$ in. long. Seeds $\frac{1}{20}$ in. long, finely tuberculate. Fl. B. I. v. 4, p. 539; Trim. Fl. Ceyl. v. 3, p. 337; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358; Watt, Dict. Econ. Prod. v. 4, p. 557. *Rostellaria procumbens*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 101; Dalz. & Gibs. p. 193 (by error *Rostellularia*).—Flowers: Oct.–Mar. VERN. *Karambal*; *Kalmashi*.

KONKAN: *Stocks*! DECCAN: *Woodrow*!; Panchgani, *Raoji*!—DISTRIB. India (W. Peninsula); Ceylon, Malaya, Australia.

Justicia Gendarussa, Burm. Fl. Ind. (1768) p. 10. A strong-scented plant of a purple hue, very common in gardens as an edging in shady positions. It is probably a native of China, but often met with in

Bengal and occasionally in the Bombay Presidency as an escape. Beddome says that the plant is wild in Tenasserim. Fl. B. I. v. 4, p. 532; Grah. Cat. p. 164; Dalz. & Gibs. Suppl. p. 71; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357 & Gard. in Ind. ed. 5, p. 417; Watt, Dict. Econ. Prod. v. 4, p. 557.—VERN. *Tev*; *Jagat-madan*.

33. **MONECHMA,** Hochst.

Herbs. Leaves entire, small. Flowers in strobilate or lax spikes, or axillary and solitary; bracts ovate to linear-oblong; bracteoles minute or 0. Calyx divided nearly to the base; segments 5 or 4, narrow or linear. Corolla small, 2-lipped; upper lip subentire. Stamens 2; one anther-cell below the other, tailed. Ovary 2-celled; ovules 1 or 2 in each cell; style shortly 2-lobed or subentire. Capsule small, usually pubescent, 2-seeded. Seeds discoid, quite smooth, often shining and blotched, without tubercles or corrugations.—DISTRIB. All African except 1 species (the following), which extends through Arabia to India; species 27.

The 2-seeded capsule and smooth seeds distinguish this genus from *Justicia*.

1. **Monechma bracteatum,** *Hochst. in Flora*, v. 24 (1841) p. 375. An erect herb 1–2 ft. high; stems softly pubescent, very little branched, subquadrangular, grooved. Leaves $1\frac{1}{4}$–$2\frac{1}{2}$ by $\frac{3}{8}$–$\frac{5}{8}$ in., oblong-lanceolate, subobtuse, glabrous or nearly so, base tapering into the petiole; main nerves few, 4–6 pairs; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long. Flowers in axillary subsessile spikes 1–2 in. long; bracts $\frac{3}{8}$ by $\frac{1}{6}$ in., elliptic, obtusely rounded and mucronate at the apex, tapering at the base into a short stalk, reticulately veined, hairy on both sides, the margins densely ciliate with long white hairs; bracteoles $\frac{1}{16}$ in. long, ovate, lanceolate, hairy. Calyx $\frac{1}{4}$ in. long, densely hairy, divided almost to the base; segments linear-subulate. Corolla $\frac{1}{3}$ in. long, pubescent outside; upper lip $\frac{1}{10}$ in. long, oblong, rounded and entire at the apex; lower lip $\frac{1}{8}$ in. long, obovate, subequally 3-lobed, the lobes about $\frac{1}{16}$ in. deep, rounded. Filaments of the anthers glabrous; lower anther-cells with a white appendage. Ovary densely hairy; style nearly glabrous; stigma minutely 2-lobed. Capsules $\frac{1}{4}$ by $\frac{1}{8}$ in., clothed with somewhat deflexed hairs, the upper part above the stalk almost orbicular, shortly and bluntly pointed, 2-seeded; solid stalk rather narrow, $\frac{1}{10}$ in. long, Seeds nearly $\frac{1}{8}$ in. in diam., orbicular, flat, yellow, smooth and shining, quite glabrous. C. B. Clarke, in Dyer, Fl. Trop. Afr. v. 5 (1900) p. 214.—Flowers: Nov.

Rare. GUJARAT: Porbandar (Kathiawar), *Cooke!*, *Woodrow!* The plant has been grown in the Botanic Garden of the College of Science at Poona from seed obtained at Porbandar.

34. **ADHATODA,** Nees.

Tall shrubs. Leaves entire, attenuated at each end. Flowers subsessile in the axils of opposite bracts, in axillary and terminal pedunculate spikes often forming a thyrsus at the ends of the branches or fascicled in the upper axils; bracts herbaceous, elliptic or oblong, exceeding the calyx; bracteoles subsimilar, nearly as large as the bracts. Calyx shortly campanulate; lobes 5, imbricate, the 2 lowest often subconnate. Corolla

2-lipped; tube short; upper lip galeate, subentire; lower lip spreading, 3-lobed. Stamens 2, inserted near the top of the corolla-tube; anthers 2-celled, the cells acute, minutely apiculate but not tailed at the base. Disk cupular. Ovary 2-celled, usually tomentose; ovules 2 in each cell; style filiform, subclavate above; stigma entire. Capsule oblong, clavate, contracted below into a long solid stalk. Seeds usually 1 or 2, suborbicular, compressed, rugose.—DISTRIB. Tropical Asia, Africa and America; species 8.

1. **Adhatoda Vasica**, *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 103. A dense shrub 4–8 ft. high with many long opposite ascending branches; stem with yellowish bark, terete, glabrous. Leaves 5–8 by 1½–2½ in., elliptic-lanceolate, acuminate, minutely puberulous when young, glabrous when mature, entire, dark-green above, paler beneath, base tapering; main nerves 10–12 pairs with reticulate venation between; petioles ½–1 in. long. Flowers in short dense axillary pedunculate spikes 1–3 in. long, towards the ends of the branches; peduncles 1½–4 in., stout, shorter than the leaves; bracts reaching ⅞ by ½ in., elliptic, subacute, glabrous or nearly so, 5–7-nerved, closely reticulately veined; bracteoles ¾ by ⅛ in., oblong-lanceolate, acute, with ciliolate margins, 1-nerved, reticulately veined. Calyx rather less than ½ in. long, glabrous or slightly pubescent, divided to within 1/12 in. of the base; segments imbricate, oblong-lanceolate, acute, 3-nerved, reticulately veined. Corolla white, with a few irregular rose-colored bars in the throat, 1¼ in. long, pubescent outside; tube ½ in. long, the lower half cylindric, ⅛ in. in diam., the upper half much laterally inflated; upper lip ¾ by ½ in. long, ovate-oblong, curved, obtuse, notched; lower lip as long as the upper, the lobes ½ in. deep, oblong, rounded, the middle lobe the broadest. Filaments hairy at the very base, long, stout, curved; lower anther-cells minutely apiculate (not white-spurred) at the base. Ovary pubescent; lower part of style pubescent. Capsules ¾–⅞ by ⅓ in., clavate, subacute, shortly and bluntly pointed, pubescent; solid stalk flattened, ⅜ in. long. Seeds ¼ by ⅛ in., orbicular-oblong, tubercular-verrucose, glabrous. Fl. B. I. v. 4, p. 540; Dalz. & Gibs. p. 194; Trim. Fl. Ceyl. v. 3, p. 338; Talb. Trees, Bomb. ed. 2, p. 265; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358; Watt, Dict. Econ. Prod. v. 1, p. 109. *Justicia Adhatoda*, Linn. Sp. Pl. (1753) p. 15; Grah. Cat. p. 164.—Flowers: Aug.–Nov. VERN. *Adulsa.*

Common as a hedge-plant about villages throughout the Presidency from Gujarat to N. Kanara.—DISTRIB. Throughout India, often cultivated; Ceylon; Singapore, Malaya.

A yellow dye is obtained from the leaves. The leaves and the root are considered an efficacious remedy in all sorts of coughs and colds. See Watt, Dict. Econ. Prod. l. c.

35. **RHINACANTHUS,** Nees.

Shrubs laxly branched, sometimes subscandent. Leaves entire. Flowers solitary or in small cymes, sessile or nearly so, in dense or divaricate panicles; bracts and bracteoles small, shorter than the calyx. Calyx deeply 5-fid or 5-partite; segments narrow. Corolla 2-lipped; tube long, narrow, cylindric, scarcely enlarged above; upper lip linear-oblong, entire or shortly 2-lobed, twisted or recurved; lower lip broad, 3-lobed. Stamens 2, inserted on the throat of the corolla; anthers 2-celled, the cells superposed, muticous. Disk cupular. Ovary 2-celled;

ovules 2 in each cell; style filiform; stigma minutely 2-fid. Capsule clavate, contracted below into a long cylindric stalk, 4-seeded. Seeds ovoid or suborbicular, compressed, glabrous, obscurely rugose or tuberculate.—DISTRIB. India and Africa; species 4.

1. **Rhinacanthus communis,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 109. An undershrub 3–5 ft. high; stems subterete or obscurely angled, glabrous or pubescent. Leaves 2–4 by $\frac{3}{4}$–2 in. (occasionally larger), elliptic-lanceolate, acute, entire, lineolate, glabrous or nearly so, base tapering; main nerves 8–10 pairs; petioles $\frac{1}{3}$–$\frac{1}{2}$ in. long, often obscure. Flowers sessile or shortly pedicellate, solitary or 2 or 3 together, distant on the divaricate branches of very large lax terminal panicles; bracts and bracteoles $\frac{1}{12}$ in. long, ovate-lanceolate, glandular-pubescent. Calyx $\frac{1}{6}$ in. long, glandular-pubescent; segments $\frac{1}{8}$ in. long, subequal, linear, subacute. Corolla 1–1$\frac{1}{4}$ in. long, white, hairy outside; tube $\frac{5}{8}$–$\frac{3}{4}$ by $\frac{1}{16}$ in.; upper lip $\frac{3}{8}$ in. long by $\frac{1}{12}$ in. broad at the base and about $\frac{1}{20}$ in. broad at top, bifid; lower lip $\frac{1}{2}$ in. long; lobes oblong, obtuse. Filaments glabrous; lower anther-cells muticous. Ovary glabrous; style pubescent. Capsules $\frac{3}{4}$–$\frac{7}{8}$ in. long, narrow, pointed, velvety-pubescent, not much swollen above the solid stalk which is more than half the length of the capsule. Seeds $\frac{1}{10}$ in. in diam., tuberculate, glabrous, black. Fl. B. I. v. 4, p. 541; Dalz. & Gibs. p. 194; *Wight*, Icon. t. 464; Trim. Fl. Ceyl. v. 3, p. 339; Talb. Trees, Bomb. ed. 2, p. 265; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358; *Watt, Dict. Econ. Prod. v. 6,* part 1, p. 488. *Justicia nasuta,* Linn. Sp. Pl. (1753) p. 16; Grah. Cat. p. 164.—Flowers: Oct.–Jan. VERN. *Gajkarni*; *Nágamalli.*

DECCAN: Mahableshwar hills, *Dalzell & Gibson, Ralph!, Cooke!, Woodrow*; Khandala, *Cooke!* S. M. COUNTRY: arid hills N.E. of Belgaum, *Ritchie,* 923!—DISTRIB. Throughout India, cultivated, perhaps wild in the Deccan Peninsula; Ceylon (wild, not cultivated, *fide* Trimen), Straits Settlements, Java, Madagascar (cultivated), Tropical Africa.

The plant is employed medicinally by the natives of India. The fresh root and leaves bruised and mixed with lime-juice and pepper are employed as an external application in the variety of ringworm known as *Dhobi's itch.* See Watt, Dict. Econ. Prod. l. c.

36. **PERISTROPHE,** Nees.

Erect spreading herbs. Leaves entire. Flowers purple or rose-colored, solitary or in small cymose heads, often arranged in large lax panicles; bracts in pairs, longer than the calyx, often unequal, linear or ovate; bracteoles in pairs, shorter than the bracts, linear or lanceolate. Calyx small, 5-partite; segments subequal, linear-lanceolate. Corolla 2-lipped; tube slender; upper lip subentire; lower lip shortly 3-lobed. Stamens 2; filaments pubescent below; anthers 2-celled, the cells one above the other, muticous. Disk cupular. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma shortly 2-lobed. Capsule ellipsoid, with a cylindric stalk, 4-seeded; placentas not rising elastically from the base of the capsule. Seeds discoid, glabrous, minutely glandular-papillose.—DISTRIB. Warmer regions of the Old World; species 20.

1. **Peristrophe bicalyculata,** *Nees, in Wall. Pl. As. Rar.* v. 3 (1832) p. 113. Herbaceous, 3–4 ft. high; stems and branches usually

6-angled, more or less hairy, usually rough on the angles. Leaves 2–3 by 1–1½ in., ovate, acuminate, densely lineolate, more or less hairy above, somewhat densely so on the nerves and veins beneath, base usually rounded; main nerves 4–6 pairs; petioles ¼–⅝ in. long. Flowers in trichotomous cymes in large lax divaricate pubescent panicles; bracts beneath the calyx 2, opposite, often very unequal, the longer of the pair sometimes ⅜ in., the shorter ¼ in. long, linear, acute, mucronate, with white membranous margins; bracteoles 4, similar to the bracts but shorter, subequal or sometimes unequal. Calyx ⅛–⅙ in. long, divided to within about 1/20 in. of the base; segments lanceolate-subulate with ciliolate margins. Corolla rosy, nearly ½ in. long, pubescent outside; upper lip ¼ by ⅛ in., elliptic-oblong, obtuse, entire; lower lip slightly longer, oblong, with 3 acute lobes about 1/25 in. deep. Filaments hairy; anther-cells one almost entirely above the other, muticous. Ovary pubescent at the tip; style nearly glabrous. Capsules ⅓ by 1/10 in., narrowed into a cylindric stalk 1/10 in. long, pointed, pubescent. Seeds 1/10–⅛ in. in diam., orbicular, papillose and slightly rugose. Fl. B. I. v. 4, p. 554; Dalz. & Gibs. p. 197; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358; Aitch. Pb. & Sind Pl. p. 114; Watt, Dict. Econ. Prod. v. 6, part 1, p. 141. *Justicia bicalyculata,* Vahl, Symb. v. 2, p. 13; Grah. Cat. p. 164.—Flowers: Oct.–Nov.

KONKAN: *Stocks*! DECCAN: Poona, *Cooke*!, *Woodrow*! GUJARAT: Surat, *Kanitkar*! KANARA: Yellur, *Ritchie*, 1204! SIND: *Bhola Puran*!; Jemadar ka Landa, near Karachi, *Stocks*!—DISTRIB. Throughout India; Tropical Africa.

The following not belonging to any of the foregoing genera are grown as ornamental plants in gardens:—

Graptophyllum hortense, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 102. A glabrous shrub largely cultivated throughout the tropics; native country uncertain. It has green leaves mottled with creamy white patches and crimson flowers in axillary and terminal racemes. Fl. B. I. v. 4, p. 545; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358 & Gard. in Ind. ed. 5, p. 415. *Justicia picta*, Linn. Sp. Pl. ed. 2, p. 21; Dalz. & Gibs. Suppl. p. 71; Grah. Cat. p. 163.

Sanchezia nobilis, Hook. f. Bot. Mag. t. 5594. A native of Ecuador. Leaves 3–9 in. long, oblong-obovate with bright yellow veins. Corolla yellow, 2 in. long; bracts bright red. Woodr. Gard. in Ind. ed. 5, p. 415.

Aphelandra cristata, R. Br. Prodr. (1810) p. 475 in Obs. A native of the W. Indies. A shrub about 3 ft. high with lanceolate leaves 7–8 in. long and numerous large orange-scarlet flowers in terminal branching spikes. Dalz. & Gibs. Suppl. p. 71; Woodr. Gard. in Ind. ed. 5, p. 415.

Fittonia argyroneura, E. Coëm. in Fl. des Serres, v. 16 (1865) p. 103. A creeping undershrub, a native of Peru, with broad flat elliptic vivid-green leaves 4 by 3 in., traversed by a network of pure white veins. Woodr. Gard. in Ind. ed. 5, p. 415.

Fittonia Pearcei, a variety with light green leaves 3 by 2 in., with bright carmine midrib and veins, a native of Peru. Woodr. Gard. in Ind. ed. 5, p. 415.

Dianthera secunda, Griseb. in Goett. Abh. v. 7 (1857) p. 246. A shrub with ovate-lanceolate acuminate leaves and red flowers in compound terminal racemes, a native of Peru. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Justicia secunda*, Vahl, Symb. v. 2, p. 7 ; Bot. Mag. t. 2060.—Flowers : Oct.–Nov.

Phlogocanthus curviflorus, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 99. A shrub with very large leaves often 12 by 5 in. and brick-red flowers in terminal thyrses 4–8 in. long, a native of the Khasia mountains. Fl. B. I. v. 4, p. 511 ; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 357.

Beloperone aurantiaca, Benth. & Hook. f. Gen. Pl. v. 2 (1876) p. 1111. A shrub with erect stem, elliptic-lanceolate leaves, and large handsome bright orange-colored flowers. The corolla is at first golden-yellow, the tube and lower lip becoming orange-red after expansion. A native of Tropical S. America. *Cyrtanthera aurantiaca*, Hook. Bot. Mag. t. 4468 ; Woodr. Gard. in Ind. ed. 5, p. 415.

Jacobinia boliviensis, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. A shrub with oblong acuminate leaves and handsome rose-colored flowers in terminal and axillary spikes, a native of Bolivia. *Drejera boliviensis*, Nees, in DC. Prodr. v. 11 (1847) p. 334.

Order XCVII. VERBENACEÆ.

Herbs, shrubs, or trees. Leaves usually opposite or whorled, simple or (in *Vitex*) digitate ; stipules 0. Inflorescence cymose, racemose or spicate ; cymes often compound or paniculate ; bracts usually small ; flowers often brightly colored, hermaphrodite (rarely polygamous), usually irregular. Calyx inferior, gamosepalous, persistent, tubular or cup-shaped, 5–4 (rarely 6–8) -lobed or toothed. Corolla gamopetalous ; tube usually cylindric or dilated above, often curved ; limb 2-lipped or subequally lobed ; lobes 5–4 (rarely more). Stamens 4, didynamous (rarely 2, very rarely 5–6), inserted on the corolla-tube ; filaments free ; anthers 2-celled, opening by longitudinal slits. Disk usually inconspicuous. Ovary superior, sessile, 2–4 (rarely 8 or almost 1) -celled, entire or 4-lobed ; ovules variously attached, 2 (sometimes 1) in each cell ; style terminal ; stigma usually entire, less commonly 2- or more-lobed. Fruit usually more or less drupaceous, 2–4- or 1-celled ; mesocarp juicy, fleshy or dry ; endocarp usually bony. Seed erect or pendulous, separate in distinct cells ; albumen 0 in the Indian genera ; embryo straight ; radicle inferior.—Distrib. Chiefly in the tropical regions of both hemispheres ; genera 73 ; species 700.

Inflorescence with the lowest flowers opening first (*centripetal*) ; flowers in dense spikes.
  Fruit with two or one 1-seeded pyrenes.
    Calyx small, less than $\frac{1}{10}$ in. long.
      Calyx truncate or obscurely toothed ; fruit drupaceous, succulent, indehiscent ; shrubs . 1. Lantana.

Calyx 2–4-lobed or toothed; fruit dry, hard, partially dehiscent; a prostrate herb (the only Bombay species) ..... 2. LIPPIA.
Calyx ¼ in. long.
Small shrubs; perfect stamens 4, didynamous ..... 3. BOUCHEA.
A herb; perfect stamens 2 ..... 4. STACHYTARPHETA.
Fruit with two 2-seeded pyrenes ..... 5. PRIVA.
Inflorescence cymose, centrifugal.
Cymes lax, paniculate; trees or shrubs.
Corolla regular; stamens isomerous, equal; leaves simple.
Calyx small, not accrescent in fruit; corolla purple or red; fruit with four 1-seeded pyrenes ..... 6. CALLICARPA.
Calyx accrescent in fruit; corolla white; fruit with one 4-celled pyrene ..... 7. TECTONA.
Corolla 2-lipped; stamens 4, didynamous.
Fruit with one normally 4-celled pyrene.
Leaves simple, entire or toothed.
Flowers large, 1 in. long or more ... 8. GMELINA.
Flowers small ..... 9. PREMNA.
Leaves digitate ..... 10. VITEX.
Fruit with four 1-seeded pyrenes; leaves simple ..... 11. CLERODENDRON.
Cymes densely capitate; trees or shrubs.
Cymes 3–9-flowered; bracts of flower-heads large, forming an involucre; calyx 3–8-toothed; fruit small, nearly dry ..... 12. SYMPHOREMA.
Cymes many-flowered; bracts shorter than the calyx; calyx 5-partite ..... 13. AVICENNIA.

1. **LANTANA,** Linn.

Rambling pubescent or glabrous shrubs; branches 4-angled, sometimes prickly. Leaves usually simple, opposite, petiolate, crenate, often rugose. Flowers in pedunculate, capitate, ovoid or cylindric spikes; bracts ovate, conspicuous, longer than the calyx; bracteoles 0. Calyx small, membranous, truncate or obscurely toothed. Corolla-tube slender, cylindric; lobes 4–5, spreading. Stamens 4, didynamous, inserted about the middle of the tube, included; anthers broadly oblong. Ovary 2-celled; ovule solitary in each cell, erect from the base or attached laterally close to the base of each cell; style short; stigma oblique, subcapitate. Fruit drupaceous with a more or less fleshy mesocarp; endocarp hard, separating when ripe into two 1-celled 1-seeded pyrenes. Seeds exalbuminous; radicle inferior.—DISTRIB. Mostly Tropical American; several introduced into the tropical and subtropical regions of the Old World; species about 50.

1. **Lantana indica,** *Roxb. Hort. Beng.* (1814) p. 46. A shrub 3–8 ft. high; branches quadrangular, strigosely hairy, yellowish-brown. Leaves 1½–2½ by 1–1½ in., opposite or in whorls of 3, ovate, acute or subobtuse, crenate-serrate, rugose and finely pubescent above, softly white-pubescent or subvillous beneath, rounded but usually suddenly narrowed at the base; petioles ¼–⅜ in. long. Flowers odorless, sessile, in axillary pedunculate ovoid heads ½–¾ in. long, lengthening out into short spikes and elongating in fruit; peduncles 1–3¼ in. long, usually

in opposite axils, 4-sided, slender, hairy, somewhat thickened upwards; bracts reaching $\frac{3}{8}$ in. long, ovate, acuminate, softly hairy on both sides, smaller upwards. Calyx $\frac{1}{16}$ in. long, truncate, membranous, very hairy. Corolla light-purple with a yellowish tube, hairy outside; tube $\frac{1}{4}$ in. long, cylindric, often slightly swollen over the stamens; limb $\frac{1}{3}$ in. across; lobes 4, rounded, spreading. Filaments very short, slender. Ovary glabrous; style short, about $\frac{1}{30}$ in. long. Drupe $\frac{1}{6}$ in. in diam., purple. Fl. B. I. v. 4, p. 562; Grah. Cat. p. 156; Wight, Icon. t. 1464; Trim. Fl. Ceyl. v. 3, p. 346; Talb. Trees, Bomb. ed. 2, p. 267; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Lantana alba*, Schauer, in DC. Prodr. v. 11 (1847) p. 606; Dalz. & Gibs. p. 198.—Flowers: Sept.-Jan.

Not very common. KONKAN: *Stocks*! DECCAN: thinly scattered, *Dalzell & Gibson*; Schivneri fort, Junnar, *Kanitkar*! S. M. COUNTRY: Dharwar, *Graham, Dalzell & Gibson*. GUJARAT: Chandod, *Kanitkar*!; Surat, *Kanitkar*!—DISTRIB. Throughout India; Ceylon, Beluchistan, Trop. Africa.

Lantana Camara, Linn. Sp. Pl. (1753) p. 627. A straggling shrub with an odor of black currants, numerous recurved prickles on the branches and orange-colored flowers, a native of Tropical America, has run wild in many parts of the Bombay Presidency and, from the rapidity with which it is propagated and the difficulty of eradicating it when established, seems likely to become a serious evil. Introduced into Ceylon in 1824 it spread throughout the moist low country often to the exclusion of all other plants. Recently cross-bred varieties of the plant with variously colored flowers, varying from pure white to dark crimson, have been introduced into gardens. Woodrow (Gard. in Ind. ed. 5, p. 420) recommends that the pruning-shears should be applied immediately after flowering to prevent seed ripening and that all seedling plants should be destroyed. Fl. B. I. v. 4, p. 562; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 358. *Lantana aculeata*, Linn. Sp. Pl. (1753) p. 627; Dalz. & Gibs. Suppl. p. 68.—Flowers: More or less throughout the year. VERN. *Tántáni*.

2. **LIPPIA**, Linn.

Shrubs or undershrubs, rarely herbs; the only Bombay species a prostrate herb with stems widely creeping and rooting at the nodes. Leaves small, opposite, serrate. Flowers small, in dense long-stalked, axillary heads; bracts small; bracteoles 0. Calyx small, membranous, 2–4-lobed, ultimately 2-valved, enclosing or sometimes adhering to the fruit. Corolla-tube cylindric, straight or curved; limb oblique, more or less 2-lipped; upper lip 2-fid, emarginate or 2-lobed; lower lip 3-lobed. Stamens 4, didynamous, included; anthers ovate with parallel cells. Ovary 2-celled; ovule solitary in each cell, erect from the base or laterally attached near the base of the cell; style short; stigma oblique, subcapitate. Fruit small, with a hard dry epicarp, enclosed in the slightly accrescent calyx; endocarp hard and bony, easily separable into two 1-seeded pyrenes. Seeds exalbuminous; radicle inferior.—DISTRIB. Chiefly Tropical America and Africa; species 110.

1. **Lippia nodiflora,** *Michaux, Fl. Bor. Amer.* v. 2 (1803) p. 15. A creeping perennial herb; stems rooting at the nodes, much-branched, subquadrangular, more or less clothed with appressed, medifixed, white hairs, sometimes nearly glabrous. Leaves opposite, subsessile, ¾–1¼ by ⅜–¾ in., spathulate, cuneate at the base, rounded at the apex, deeply and sharply serrate in the upper part, appressedly hairy on both sides with medifixed white hairs. Flowers sessile, densely packed in long-pedunculate axillary heads which are at first globose, afterwards elongate and becoming spicate and oblong in fruit; peduncles 1–3 in. long, usually from the axil of one only of each pair of leaves; bracts $\frac{1}{10}$ in. long, broadly elliptic or obovate with a somewhat cuneate base, mucronate, glabrous. Calyx $\frac{1}{12}$ in. long, membranous, deeply 2-lobed, compressed, mitre-shaped, pubescent on the back with basifixed hairs, closely covering the fruit, the 2 acuminate lobes projecting beyond it. Corolla $\frac{1}{10}$–$\frac{1}{8}$ in. long, white or pale-pink, pushed off as a calyptra by the ripening fruit, 2-lipped; upper lip erect, bifid; lower lip 3-lobed, the middle lobe the largest. Fruit $\frac{1}{16}$ in. long, globose-oblong, dry, splitting into two 1-seeded plano-convex glabrous pyrenes. Fl. B. I. v. 4, p. 563; Dalz. & Gibs. p. 198; Wight, Icon. t. 1463; Trim. Fl. Ceyl. v. 3, p. 347; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 5, p. 78. *Zapania nodiflora,* Lam. Tab. Encyc. v. 1 (1791) p. 59; Grah. Cat. p. 158.—Flowers: more or less all the year. VERN. *Ratoliya.*

Common in grassy and sandy places throughout the Presidency. DECCAN: *Woodrow*; Poona, *Cooke*!; Bijapur, *Woodrow*! GUJARAT: *Woodrow*; Porbandar, *Cooke*! SIND: *Cooke*!, *Woodrow.*—DISTRIB. Throughout India; Ceylon, Africa, and most tropical and subtropical regions.

3. **BOUCHEA,** Cham.

Perennial herbs or low undershrubs. Leaves opposite or subopposite, petiolate, ovate or oblong, usually toothed. Flowers sessile or shortly pedicellate, in terminal spikes or spicate racemes, solitary in the axils of persistent bracts which are shorter than the calyx; bracteoles minute or 0. Calyx narrowly tubular, prominently 5-ribbed, obliquely truncate or shortly 5-toothed, usually becoming more or less dilated below as the fruit ripens, at length splitting longitudinally to the base. Corolla-tube long, slender, cylindric; limb spreading, oblique, with 5 subequal lobes. Perfect stamens 4, didynamous, inserted in the upper part of the corolla-tube, included; filaments very short; anthers ovate with parallel cells. Ovary 2-celled; ovules 1–2 in each cell, erect from the base of the cell; style filiform; stigma sub-2-lobed. Fruit usually shorter than the calyx and enclosed in it, separating into two elongate-oblong 1-seeded pyrenes.—DISTRIB. Tropical and S. Africa, Tropical America, India; species 25.

1. **Bouchea marrubifolia,** *Schauer, in DC. Prodr.* v. 11 (1847) p. 558. A much-branched woody perennial herb; stems and branches pubescent. Leaves ½–1 by ⅜–1 in., broadly ovate or suborbicular, coarsely toothed, pubescent on both sides, strongly nerved and rugosely reticulately veined, base truncate or shortly cuneate; petioles ½–⅝ in. long. Flowers sessile, in nearly continuous spikes reaching sometimes 8 in. long, closely appressed to the pubescent rhachis; bracts ⅛–⅙ in.

long, lanceolate, pubescent, with scarious ciliate margins. Calyx tubular, ¼–⅓ in. long, densely pubescent, 5-ribbed, ultimately splitting down one side, truncate at the top, the teeth very minute. Corolla glabrous outside; tube slender, ½ in. long, slightly enlarged below the limb; limb ⅙ in. across; lobes 5, rounded, spreading. Filaments slender, glabrous. Ovary and style glabrous. Fruit ⅛ in. long, enclosed in the calyx, rounded at the apex, consisting of 2 oblong glabrous pyrenes. Fl. B. I. v. 4, p. 564; Wight, Icon. t. 1461; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359.

In the Bombay Presidency confined to Sind. SIND: *Dalzell*!, *Bhola Puran*!; rocky ground, *Stocks*!; Karachi, *Cooke*!; spur of the Hala range, *Vicary*!; hills in Sind, *Stocks*, 498!—DISTRIB. Arabia, Egypt, Abyssinia, Tropical Africa.

4. **STACHYTARPHETA,** Vahl.

Herbs or shrubs, hairy or glabrous. Leaves opposite or alternate, toothed, usually rugose. Spikes terminal, long and slender (in the Indian species); flowers solitary in the axils of bracts, sessile or half immersed in the rhachis of the spike; bracts lanceolate, long or short; bracteoles 0. Calyx elongate, narrowly cylindric, shortly 4–5-toothed, often variously slit in a late stage. Corolla-tube slender, cylindric; limb oblique, with 5 equal or unequal flat spreading lobes. Perfect stamens 2 (the lower pair), included in the corolla-tube; staminodes 2, minute or 0; filaments short; anthers without appendages, the cells vertical, divaricate. Ovary 2-celled; ovule solitary in each cell, attached laterally near the base of the cell; style long, filiform. Fruit enclosed in the calyx, linear-oblong, separating into two hard 1-seeded pyrenes.—DISTRIB. Mostly Tropical American; species about 40.

1. **Stachytarpheta indica,** *Vahl, Enum.* v. 1 (1805) p. 206. Annual, 1–3 ft. high; stems erect, dichotomously branched, nearly glabrous; young branches nearly quadrangular. Leaves 2–4 by 1–1½ in., elliptic, obtuse or acute, coarsely serrate, glabrous or nearly so, base much tapering and decurrent into the petioles which are consequently obscure. Flowers sessile, in long, slender, nearly continuous glabrous spikes reaching 1 ft. long, the rhachis hollowed out beneath each flower; bracts ⅕ in. long, lanceolate-subulate, scariously margined near the base. Calyx ¼ in. long, membranous, tubular, glabrous; teeth 4, short, acute. Corolla deep-blue, glabrous; tube ⅜ in. long, slightly curved, hairy inside; limb about ⅜ in. across, 5-lobed. Filaments slender, hairy below. Ovary glabrous; style long, filiform, glabrous. Fruit ⅛–⅙ in. long, oblong, ribbed, splitting into 2 pyrenes. Fl. B. I. v. 4, p. 564; Grah. Cat p. 154; Trim. Fl. Ceyl. v. 3, p. 348; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359. *Stachytarpheta urticifolia*, Dalz. & Gibs. Suppl. p. 68. *S. jamaicensis*, Vahl, Enum. v. 1, p. 206; Grah. Cat. p. 154.—Flowers: Aug.–Nov.

Though common as a weed in gardens and as an escape, the plant cannot be considered indigenous. It is very abundant along roadsides about Dharwar.—DISTRIB. Throughout India; Ceylon; Tropical Asia, America, Africa, sometimes cultivated.

Stachytarpheta mutabilis, Vahl, Enum. v. 1 (1805) p. 208. An erect branching shrub reaching 6 ft. high, a native of S. America, with acutely tetragonal branches, ovate leaves decurrent into the petiole and flowers in long spikes reaching 1½ ft. long. The corolla is at first crimson then rose-colored. Grah. Cat. p. 154; Dalz. & Gibs. Suppl. p. 68; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359. *Verbena mutabilis*, Jacquin, Collect. v. 2 (1788) p. 334.

5. **PRIVA**, Adans.

Erect herbs. Leaves toothed. Flowers solitary, bracteate, arranged in simple terminal or axillary spikes or racemes; bracteoles 0. Calyx tubular, becoming inflated in fruit, 5-ribbed, the ribs terminating in short teeth. Corolla-tube narrowly cylindric, straight or curved; limb spreading, 5-lobed, sub-2-lipped, the 2 upper lobes usually shorter than the 3 lower. Stamens 4, didynamous, inserted in the middle of the corolla-tube, included; anther-cells parallel or slightly divergent; upper staminode minute or 0. Ovary 2-celled; ovules 2 in each cell; style long, filiform, persistent; stigma on one side. Fruit dry, enclosed in the dilated calyx-tube, separating when ripe into two 2-seeded pyrenes. —DISTRIB. Warm regions of both hemispheres; species about 10.

1. **Priva leptostachya,** *Juss. in Ann. Mus. Par.* v. 7 (1806) p. 70. An erect branched herb 1–3 ft. high; stems quadrangular, pubescent (especially at the nodes), with small often hooked hairs; internodes long. Leaves 1–3 by ¾–2 in., ovate or elliptic, obtuse, clothed on both sides with fine hooked hairs and also with a few stout hairs above, coarsely crenate-serrate, base subcordate or truncate, but slightly decurrent on the petiole; petioles ¼–1¼ in. long. Flowers distant, in long spicate racemes 6–12 in. long; rhachis quadrangular, more or less pubescent with small often hooked hairs; pedicels $\frac{1}{20}$ in. long; bracts $\frac{1}{10}$ in. long, linear-lanceolate, hairy. Calyx ⅛ in. long, nearly cylindric in flower, becoming nearly globose in fruit, densely clothed with fine spreading hooked hairs; teeth small, acute. Corolla pure-white; tube ⅓ in. long, scarcely enlarged above; limb 2-lipped; upper lip 2-lobed; lower lip larger than the upper, deeply 3-lobed. Fruit enclosed in the enlarged calyx, ⅛ in. long, obcordate, readily splitting into 2 glabrous pyrenes which are reticulately pitted, echinate on the back with 2 rows of straight and curved spines, deeply excavate on the faces. Fl. B. I. v. 4, p. 565; Dalz. & Gibs. p. 198; Trim. Fl. Ceyl. v. 3, p. 349; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359. *Streptium asperum*, Roxb. Cor. Pl. v. 2 (1798) p. 25, t. 146; Grah. Cat. p. 154.—Flowers: Dec.–Jan.

Rare. DECCAN: Bijapur, *Cooke*!, *Woodrow*; Dapuri on old walls, *Dr. Lush* ex *Graham*. SIND: *Woodrow*!—DISTRIB. India (W. Peninsula), Africa.

6. **CALLICARPA**, Linn.

Trees or shrubs; young branches stellately hairy. Leaves opposite (rarely ternate), crenulate, serrulate or toothed (rarely quite entire). Flowers small, in axillary sessile or pedunculate many-flowered cymes which are shorter than the leaves. Calyx very small, shortly campanulate, truncate or minutely 4-lobed, unaltered in fruit. Corolla purple

or red; tube short; lobes 4, subquadrate, spreading. Stamens 4, equal, inserted above the middle of the tube, usually exserted; anthers 2-celled, the cells parallel. Ovary imperfectly 2-celled; ovules 2 in each cell; style linear; stigma dilated, obscurely 2-fid. Fruit a small globose drupe; pyrenes 4 or fewer by suppression, 1-seeded. Seeds shortly oblong; albumen 0.—DISTRIB. Tropical and Subtropical Asia, Malaya, Japan, N. Australia, N. and Central America, W. India; species 30.

1. **Callicarpa lanata,** *Linn. Mant.* v. 2 (1771) p. 331. A tall shrub or sometimes a small tree; bark grey, rough and corky; young branches stout, cylindric, closely covered with a thick easily detachable felt of grey or fulvous stellate hairs. Leaves crowded towards the ends of the branches, 6–9 by 3–4 in., ovate or elliptic-lanceolate, acuminate, entire or toothed, dark-green, rugose, glabrous and shining above, with dense stellate tomentum beneath; base rounded, cordate or acute; main nerves 6–9 pairs, impressed above, very prominent beneath, with conspicuous reticulate venation between; petioles 1–1¾ in. long, stout, densely tomentose. Flowers sessile, in divaricately branched shortly pedunculate densely stellately tomentose axillary cymes; bracts scarcely $\frac{1}{20}$ in. long, linear. Calyx $\frac{1}{10}$ in. long, campanulate, very faintly 4-lobed, densely stellately tomentose. Corolla $\frac{1}{6}$ in. long, reddish-purple, glabrous; tube $\frac{1}{10}$ in. long; lobes 4, subequal, subquadrate, rounded. Stamens much exserted; filaments slender, glabrous; anthers cream-colored, the cells parallel. Ovary and style glabrous. Drupe scarcely $\frac{1}{6}$ in. in diam., globose, black, smooth, shining. Fl. B. I. v. 4, p. 567; Grah. Cat. p. 156; Trim. Fl. Ceyl. v. 3, p. 350; Talb. Trees, Bomb. ed. 2, p. 269; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 2, p. 26. *Callicarpa cana,* Dalz. & Gibs. p. 200 (*not* of Linn.). *C. Wallichiana,* Walp. Rep. v. 4, p. 125; Wight, Icon. t. 1480.—Flowers: Dec.–Apr. VERN. *Aisar.*

KONKAN: common on the Ghâts, *Dalzell & Gibson*; hills east of Panvel, *Graham*; Marmagão, *Kanitkar*!; Matheran, *Cooke*! DECCAN: Khandala, *Graham, Cooke*!; Párghât, *Graham*; Mahableshwar, *Cooke*! S. M. COUNTRY: Castlerock, *Woodrow*; Rámghât, *Ritchie*, 570! KANARA: evergreen forests of N. Kanara Ghâts, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

The plant has some repute in native medicine (see Watt, Dict. Econ. Prod. l. c.). The tomentose buds are used as wicks in oil-lamps (*Talbot*).

7. **TECTONA,** Linn. f.

Trees stellately tomentose. Leaves opposite or whorled, large, petiolate, entire. Flowers small, numerous, in dichotomous cymes arranged in large terminal panicles; bracts small, narrow. Calyx campanulate, shortly 5–6-lobed, enlarged and becoming bladder-like in fruit, ovoid or urceolate. Corolla white; tube short; limb with 5–6 short subequal spreading imbricate lobes. Stamens 5–6, inserted near the base of the corolla, equal, exserted; anthers ovate or oblong with distinct parallel cells. Ovary fleshy, 4-celled; ovule solitary in each cell; style linear; stigma shortly 2-fid. Fruit a drupe enclosed in the enlarged calyx; endocarp thick, bony, 4-celled. Seeds erect, oblong; albumen 0.—DISTRIB. Species 3 Asiatic, of which 2 are Indian and 1 a native of the Philippine Islands.

1. **Tectona grandis,** *Linn. f. Suppl.* (1781) p. 151. A large deciduous tree; branchlets quadrangular, channelled, stellately tomentose. Leaves 1–2 by ½–1 ft. (in seedlings often much larger), elliptic or obovate, acute or acuminate, the upper surface rough but usually glabrous, the lower clothed with dense stellate grey or tawny tomentum, entire, base usually cuneate; main nerves 8–10 pairs with 2 or 3 large branches near the edge of the leaf, joined by numerous parallel transverse veins. Flowers shortly pedicellate, in large erect terminal branched tomentose cymose panicles 1–3 ft. long, with lanceolate bracts at the forks; bracts beneath the calyx $\frac{1}{10}$ in. long, linear-lanceolate. Calyx in flower ⅛ in. long, stellately tomentose, semiglobose-campanulate, the lobes 5 or 6, spreading, subequal, $\frac{1}{20}$ in. long; in fruit enlarged to 1 in. or even more long, bladder-like, enclosing the fruit, ovoid, more or less crumpled or irregularly plaited, reticulately veined. Corolla white, glabrous, 5–6-lobed; tube about $\frac{1}{12}$ in. long; limb ¼ in. across when expanded, with spreading subequal lobes. Fruit ½ in. in diam., subglobose, somewhat 4-lobed, the pericarp soft with dense felted stellate hairs; endocarp bony. Fl. B. I. v. 4, p. 570; Grah. Cat. p. 158; Dalz. & Gibs. p. 199; Bedd. Fl. Sylvat. t. 250; Talb. Trees, Bomb. ed. 2, p. 273; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 6, part 4, p. 1.—Flowers: June–Sept. VERN. *Ság*; *Ságwán.*

The well-known *Teak-tree.* It grows abundantly all along the slopes of the Western Ghâts and extends northward to the Mhye River in Gujarat (*Brandis*). For a full description of the Teak, its mode of cultivation, uses, &c., consult Watt, Dict. Econ. Prod. l. c.—DISTRIB. India (W. Peninsula, Central India, Birma); Malay Peninsula, Sumatra, Java.

8. GMELINA, Linn.

Trees or shrubs unarmed or spinous; young shoots usually tomentose. Leaves opposite, entire or toothed, sometimes more or less lobed. Flowers large, yellow or brownish-yellow, often tomentose, in small dense or lax sessile or pedunculate cymes along the branches of a terminal panicle; bracts usually narrow, rarely leafy. Calyx campanulate, 4–5-toothed or subentire, persistent and unaltered in fruit. Corolla 2-lipped, infundibuliform, ventricose in the upper part; tube slender below, much swollen above; limb oblique, spreading, 4–5-lobed. Stamens 4, didynamous, inserted below the throat, shorter than the corolla; anthers with oblong more or less discrete cells. Ovary 4-celled; ovule solitary in each cell; style slender; stigma shortly 2-fid. Fruit a succulent drupe; endocarp undivided, bony, 2–4-celled. Seeds oblong; albumen 0; cotyledons thick.—DISTRIB. India, China, Malay Archipelago, Tropical Australia; species about 8.

An unarmed tree; leaves exceeding 3 in. long, stellately fulvous-tomentose beneath; calyx-teeth 5 ..... 1. *G. arborea.*
A shrub often spinous; leaves less than 2 in. long, glabrous and studded beneath with round glands; calyx-teeth 4 ..... 2. *G. asiatica.*

1. **Gmelina arborea,** *Roxb. Hort. Beng.* (1814) p. 46. A moderate-sized unarmed deciduous tree, reaching 60 ft. high; bark greyish-yellow, rather corky; branchlets and young parts clothed with fine white mealy pubescence. Leaves 4–8 by 3–6 in., broadly ovate, acuminate, entire,

glabrous above when mature, stellately fulvous-tomentose beneath, base cordate or sometimes truncate and shortly cuneate; petioles 2–3 in. long, cylindric, puberulous, glandular at the top. Flowers appearing with or sometimes before the young leaves, usually in small cymes of about 3 flowers arranged along the branches of a densely fulvous-hairy panicle reaching 12 in. long; buds clavate, angular; bracts $\frac{1}{3}$ in. long, linear-lanceolate. Calyx $\frac{1}{5}$ in. long, broadly campanulate, densely fulvous-hairy; teeth 5, small, triangular, acute. Corolla brownish-yellow, densely hairy outside, reaching $1\frac{1}{2}$ in. long, 5-lobed, 2-lipped; upper lip rather more than $\frac{3}{8}$ in. long, deeply divided into 2 oblong, obtuse lobes; lower lip nearly 1 in. long, 3-lobed, the middle lobe projecting forward, ovate, subobtuse, with irregularly crenulate margin, much longer and broader than the obovate rounded lateral lobes. Drupe $\frac{3}{4}$–1 in. long, ovoid or pyriform, smooth, orange-yellow when ripe. Fl. B. I. v. 4, p. 581; Grah. Cat. p. 158; Dalz. & Gibs. p. 201; Wight, Icon. t. 1470; Trim. Fl. Ceyl. v. 3, p. 355; Talb. Trees, Bomb. ed. 2, p. 269; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 3, p. 514.—Flowers: Mar.–May. VERN. *Shivan.*

KONKAN: *Dalzell & Gibson.* DECCAN; Máwal, *Woodrow*; Ganesh Khind, *Woodrow*! KANARA: deciduous forests, *Talbot*; near Waguli, *Ritchie*, 1962! GUJARAT: Dangs, *Woodrow.* SIND: (introduced) *Dalzell & Gibson.*—DISTRIB. Throughout India; Ceylon, Malayan and Philippine Islands.

The root, the bark, and the fruit are used medicinally; the fruit is also eaten by some of the hill-tribes. The timber is excellent, strong and light, does not warp nor shrink, and is valuable for ornamental work. See Watt, Dict. Econ. Prod. l. c.

2. **Gmelina asiatica,** *Linn. Sp. Pl.* (1753) p. 626. A much-branched more or less spinous shrub; bark yellowish-white; branchlets horizontal, rigid, puberulous, often much shortened and spinous at the ends. Leaves $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{2}$–1 in., ovate or elliptic, sometimes irregularly and more or less obscurely lobulate, obtuse, glabrous, glaucescent beneath from a coating of minute round glands, base acute or rounded; petioles $\frac{1}{4}$ in. long. Flowers large, nodding, in terminal densely pubescent racemes or panicles; pedicels short, pubescent; bracts small, caducous. Calyx $\frac{1}{6}$–$\frac{1}{5}$ in. long, cup-shaped, truncate, pubescent, clothed with flattened round glands; lobes 4, very small, triangular, acute. Corolla 2-lipped, bright-yellow, $1\frac{3}{4}$ in. long or more, finely pubescent outside; tube narrow below, curved, very much inflated above; lobes 4, ovate, subacute, the lower one the largest. Drupe $\frac{3}{4}$ in. long, obovoid, yellow when ripe, containing 1 pyrene. Fl. B. I. v. 4, p. 582; Grah. Cat. p. 158; Wight, Ill. t. 174; Bedd. For. Man. in Flor. Sylvat. p. clxxii; Trim. Fl. Ceyl. v. 3, p. 355; Talb. Trees, Bomb. ed. 2, p. 269; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 3, p. 516.—Flowers more or less throughout the year. VERN. *Kálishivan.*

Doubtfully wild in the Bombay Presidency, where it is however extensively grown in gardens and employed for making fences. It is abundant on the Coromandel coast, being, according to Roxburgh, "one of the commonest bushes in every uncultivated place." It is also common in Ceylon and is cultivated in Bengal. The root and leaves are used in native medicine, the latter apparently possessing the property of rendering water mucilaginous. See Watt, Dict. Econ. Prod. l. c.—DISTRIB. India (W. Peninsula, Birma); Ceylon.

Gmelina Hystrix, Schult. ex Kurz, in Journ. As. Soc. Beng. v. 39 (1870) part 2, p. 81. A spinous shrub, a native of Siam and the Philippine Islands, scandent if shaded. It has smooth entire elliptic leaves 3 by 1½ in., glaucous beneath with scattered round glands, and pendulous panicles of large yellow flowers consisting of small cymes enclosed in large membranous purple-veined bracts. Fl. B. I. v. 4, p. 582; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359 & Gard. in Ind. ed. 5, p. 418.

9. **PREMNA,** Linn.

Trees or shrubs sometimes climbing. Leaves opposite, entire or toothed. Flowers in corymbose or paniculate sometimes thyrsoid pubescent cymes; bracts small, narrow; bracteoles 0. Calyx small, cup-shaped; limb truncate or minutely 2–5-toothed or 2-lipped. Corolla small; tube short; throat hairy inside; limb 2-lipped, 5-lobed or subequally 4-lobed. Stamens 4, didynamous, inserted below the throat of the corolla, rarely exserted; anthers ovate or rounded, the cells parallel or divergent. Ovary 2- or 4-celled; ovules 4; style linear; stigma shortly 2-fid. Fruit a small drupe, embraced below by the calyx, globose or oblong-obovoid; endocarp hard, undivided, normally 4- or by abortion 1–3-celled, with a central cavity. Seeds oblong; albumen 0. —Distrib. Species 40 in the warmer regions of the Old World.

A scandent shrub; corymbs purplish; calyx truncate ..... 1. *P. coriacea.*
An erect tree; corymbs greenish-yellow; calyx 2-lipped..... 2. *P. integrifolia.*

1. **Premna coriacea,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1885) p. 573. An extensive climber; bark smooth, thin, covered with round scattered corky lenticels; stems and branches glabrous or nearly so. Leaves coriaceous, 4–8 by 3–4½ in., ovate or elliptic, shortly acuminate, entire, glabrous, cordate or rounded at the base; main nerves 4–5 pairs with reticulate venation between them; petioles 1–1½ in. long. Flowers numerous, in large finely pubescent terminal paniculate corymbose cymes; pedicels very short; bracts minute, scattered. Calyx puberulous, $\frac{1}{16}$ in. long, cup-shaped, truncate, membranous. Corolla-tube $\frac{1}{16}$ in. long, hairy in the throat inside; lobes 4, as long as the tube, subequal, oblong, rounded, the lobes white, the rest of the inflorescence purple or red (*Talbot*). Filaments densely hairy. Ovary and style glabrous. Drupe ⅛ in. long, narrowly obovoid, 1-seeded, smooth, black when ripe. Talb. Trees, Bomb. ed. 2, p. 268; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359. *Premna scandens*, Grah. Cat. p. 155 (*not* of Roxb.); Dalz. & Gibs. p. 199.—Flowers: Mar.–May. Vern. *Rawan*; *Chámbári.*

Konkan: *Gibson*!, *Stocks*!, *Law*!, *Dalzell*! Deccan: Lanoli, *Kanitkar*!; Khandala, *Bhiva*! Kanara: Mandele (N. Kanara), *Ritchie*, 920!—Distrib. India (W. Peninsula).

2. **Premna integrifolia,** *Linn. Mant.* v. 2 (1771) p. 252. A large shrub or small tree reaching 30 ft. high; bark yellowish, lenticellate; young parts glabrous or slightly pubescent; trunk and large branches sometimes spinous. Leaves 2–3½ by 1¼–2½ in., broadly elliptic, obtuse, very shortly acuminate, glabrous, entire or the upper part dentate, base rounded or subacute; main nerves 4–5 pairs; petioles ⅜–⅝ in. long. Flowers small, greenish-yellow, with a disagreeable odor, in terminal

pubescent paniculate corymbose cymes; bracts minute, lanceolate. Calyx $\frac{1}{10}$ in. long, thick, glabrous, 2-lipped, one lip 2-toothed, the other subentire (so that the calyx appears 3-lobed). Corolla glabrous outside; tube $\frac{1}{8}$ by $\frac{1}{12}$ in., cylindric, hairy in the throat inside; lobes 4, oblong, rounded, $\frac{1}{20}$ in. long. Stamens slightly exserted; filaments hairy at the base. Ovary and style glabrous; stigma of 2 equal divaricate lobes. Fruit $\frac{1}{6}$ in. long, pear-shaped; endocarp ridged, bony, 4-celled, 4-seeded. Fl. B. I. v. 4, p. 574; Grah. Cat. p. 155; Wight, Icon. t. 1469; Talb. Trees, Bomb. ed. 2, p. 268; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 6, part 1, p. 337. *Premna serratifolia*, Linn. Mantiss. v. 2 (1771) p. 253; Bedd. For. Man. in Flor. Sylvat. p. clxxii; Trim. Fl. Ceyl. v. 3, p. 352. *P. latifolia*, Dalz. & Gibs. p. 200 (*not* of Roxb.).—Flowers: June–July. VERN. *Khárá-narvel.*

KONKAN: *Law!*, *Dalzell!* *Talbot*; by the sea-shore near Bombay, *Graham*. KANARA: N. Kanara usually near the sea-coast, *Talbot*.—DISTRIB. India (near the sea from Bombay to Malacca); Ceylon, Andamans and Nicobars, Malaya.

DOUBTFUL AND UNKNOWN SPECIES.

PREMNA CORDIFOLIA, Grah. Cat. Bo. Pl. (1839) p. 155; Dalz. & Gibs. p. 199 (*not* of Roxb.), which Graham describes as a small tree growing at Khandala but not common, is probably, as Mr. Talbot suggests (Trees and Shrubs Bomb. ed. 2, p. 268), a form of *P. integrifolia*, Linn., growing on the hills. In Fl. B. I. v. 4, p. 573, Graham's *P. cordifolia* is made synonymous with *P. coriacea*, C. B. Clarke, while Dalzell & Gibson's *P. cordifolia* is doubtfully referred to *P. corymbosa*, Rottl. & Willd. It is clear, however, from the way in which Dalzell & Gibson quote Graham, that these authors meant to describe the plant indicated by the latter.

PREMNA NIMMONIANA, Grah. Cat. Bo. Pl. (1839) p. 155, is said by Graham to be found on the tableland of Mahableshwar and on the Rotunda Ghát leading thereto (*fide* Dr. Murray). No such plant has been found at Mahableshwar, where it is described by Graham as common, and it is probable that some other plant has been mistaken for it. The fact that the leaves are described by Graham as alternate would indicate that his plant does not belong to the genus.

10. **VITEX,** Linn.

Trees or shrubs; young shoots hairy or tomentose. Leaves opposite, digitately 3–5-foliolate (sometimes simple in *V. trifolia*). Flowers in sessile or pedunculate cymes forming large or small terminal and axillary or wholly axillary panicles or corymbs; bracts small, longer or shorter than the calyx. Calyx campanulate, truncate or shortly 5 (rarely 3) -toothed. Corolla small, 2-lipped; tube short; limb 5-lobed, the middle lobe of the lower lip much the largest. Stamens 4, didynamous, usually exserted; anther-cells at first parallel and pendulous, afterwards divaricate, often twisting so that the lower ends are erect. Ovary 2–4-celled; ovules 4; style filiform; stigma shortly 2-fid. Fruit a globose or ovoid drupe, invested at the base by the somewhat enlarged calyx; endocarp bony, normally 4-celled and 4-seeded, but some of the cells often suppressed. Seeds obovate or oblong; albumen 0.—DISTRIB. Species 120 in all tropical and warm temperate regions.

Panicles terminal (axillary peduncles sometimes present in the upper leaf-axils):-
- Shrubs or small trees.
  - Leaves 3- and 5-foliolate; leaflets petiolulel, lanceolate. 1. *V. Negundo.*
  - Leaves 3-foliolate and simple; leaflets sessile, obovate-oblong ..... 2. *V. trifolia.*

Gmelina Hystrix, Schult. ex Kurz, in Journ. As. Soc. Beng. v. 39 (1870) part 2, p. 81. A spinous shrub, a native of Siam and the Philippine Islands, scandent if shaded. It has smooth entire elliptic leaves 3 by 1½ in., glaucous beneath with scattered round glands, and pendulous panicles of large yellow flowers consisting of small cymes enclosed in large membranous purple-veined bracts. Fl. B. I. v. 4, p. 582; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359 & Gard. in Ind. ed. 5, p. 418.

9. **PREMNA,** Linn.

Trees or shrubs sometimes climbing. Leaves opposite, entire or toothed. Flowers in corymbose or paniculate sometimes thyrsoid pubescent cymes; bracts small, narrow; bracteoles 0. Calyx small, cup-shaped; limb truncate or minutely 2–5-toothed or 2-lipped. Corolla small; tube short; throat hairy inside; limb 2-lipped, 5-lobed or subequally 4-lobed. Stamens 4, didynamous, inserted below the throat of the corolla, rarely exserted; anthers ovate or rounded, the cells parallel or divergent. Ovary 2- or 4-celled; ovules 4; style linear; stigma shortly 2-fid. Fruit a small drupe, embraced below by the calyx, globose or oblong-obovoid; endocarp hard, undivided, normally 4- or by abortion 1–3-celled, with a central cavity. Seeds oblong; albumen 0. —Distrib. Species 40 in the warmer regions of the Old World.

A scandent shrub; corymbs purplish; calyx truncate..... 1. *P. coriacea.*
An erect tree; corymbs greenish-yellow; calyx 2-lipped..... 2. *P. integrifolia.*

1. **Premna coriacea,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 4 (1885) p. 573. An extensive climber; bark smooth, thin, covered with round scattered corky lenticels; stems and branches glabrous or nearly so. Leaves coriaceous, 4–8 by 3–4½ in., ovate or elliptic, shortly acuminate, entire, glabrous, cordate or rounded at the base; main nerves 4–5 pairs with reticulate venation between them; petioles 1–1½ in. long. Flowers numerous, in large finely pubescent terminal paniculate corymbose cymes; pedicels very short; bracts minute, scattered. Calyx puberulous, $\frac{1}{16}$ in. long, cup-shaped, truncate, membranous. Corolla-tube $\frac{1}{16}$ in. long, hairy in the throat inside; lobes 4, as long as the tube, subequal, oblong, rounded, the lobes white, the rest of the inflorescence purple or red (*Talbot*). Filaments densely hairy. Ovary and style glabrous. Drupe ¼ in. long, narrowly obovoid, 1-seeded, smooth, black when ripe. Talb. Trees, Bomb. ed. 2, p. 268; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359. *Premna scandens*, Grah. Cat. p. 155 (*not* of Roxb.); Dalz. & Gibs. p. 199.—Flowers: Mar.–May. Vern. *Rawan*; *Chámbári.*

Konkan: *Gibson*!, *Stocks*!, *Law*!, *Dalzell*! Deccan: Lanoli, *Kanitkar*!; Khandala, *Bhiva*! Kanara: Mandele (N. Kanara), *Ritchie*, 920!—Distrib. India (W. Peninsula).

2. **Premna integrifolia,** *Linn. Mant.* v. 2 (1771) p. 252. A large shrub or small tree reaching 30 ft. high; bark yellowish, lenticellate; young parts glabrous or slightly pubescent; trunk and large branches sometimes spinous. Leaves 2–3½ by 1¼–2½ in., broadly elliptic, obtuse, very shortly acuminate, glabrous, entire or the upper part dentate, base rounded or subacute; main nerves 4–5 pairs; petioles $\frac{3}{8}$–$\frac{5}{8}$ in. long. Flowers small, greenish-yellow, with a disagreeable odor, in terminal

pubescent paniculate corymbose cymes; bracts minute, lanceolate. Calyx $\frac{1}{10}$ in. long, thick, glabrous, 2-lipped, one lip 2-toothed, the other subentire (so that the calyx appears 3-lobed). Corolla glabrous outside; tube $\frac{1}{8}$ by $\frac{1}{12}$ in., cylindric, hairy in the throat inside; lobes 4, oblong, rounded, $\frac{1}{20}$ in. long. Stamens slightly exserted; filaments hairy at the base. Ovary and style glabrous; stigma of 2 equal divaricate lobes. Fruit $\frac{1}{6}$ in. long, pear-shaped; endocarp ridged, bony, 4-celled, 4-seeded. Fl. B. I. v. 4, p. 574; Grah. Cat. p. 155; Wight, Icon. t. 1469; Talb. Trees, Bomb. ed. 2, p. 268; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 6, part 1, p. 337. *Premna serratifolia*, Linn. Mantiss. v. 2 (1771) p. 253; Bedd. For. Man. in Flor. Sylvat. p. clxxii; Trim. Fl. Ceyl. v. 3, p. 352. *P. latifolia*, Dalz. & Gibs. p. 200 (*not* of Roxb.).—Flowers: June–July. VERN. *Khárá-narvel.*

KONKAN: *Law!*, *Dalzell!* *Talbot*; by the sea-shore near Bombay, *Graham.* KANARA: N. Kanara usually near the sea-coast, *Talbot.*—DISTRIB. India (near the sea from Bombay to Malacca); Ceylon, Andamans and Nicobars, Malaya.

DOUBTFUL AND UNKNOWN SPECIES.

PREMNA CORDIFOLIA, Grah. Cat. Bo. Pl. (1839) p. 155; Dalz. & Gibs. p. 199 (*not* of Roxb.), which Graham describes as a small tree growing at Khandala but not common, is probably, as Mr. Talbot suggests (Trees and Shrubs Bomb. ed. 2, p. 268), a form of *P. integrifolia*, Linn., growing on the hills. In Fl. B. I. v. 4, p. 573, Graham's *P. cordifolia* is made synonymous with *P. coriacea*, C. B. Clarke, while Dalzell & Gibson's *P. cordifolia* is doubtfully referred to *P. corymbosa*, Rottl. & Willd. It is clear, however, from the way in which Dalzell & Gibson quote Graham, that these authors meant to describe the plant indicated by the latter.

PREMNA NIMMONIANA, Grah. Cat. Bo. Pl. (1839) p. 155, is said by Graham to be found on the tableland of Mahableshwar and on the Rotunda Ghát leading thereto (*fide* Dr. Murray). No such plant has been found at Mahableshwar, where it is described by Graham as common, and it is probable that some other plant has been mistaken for it. The fact that the leaves are described by Graham as alternate would indicate that his plant does not belong to the genus.

10. **VITEX,** Linn.

Trees or shrubs; young shoots hairy or tomentose. Leaves opposite, digitately 3–5-foliolate (sometimes simple in *V. trifolia*). Flowers in sessile or pedunculate cymes forming large or small terminal and axillary or wholly axillary panicles or corymbs; bracts small, longer or shorter than the calyx. Calyx campanulate, truncate or shortly 5 (rarely 3) -toothed. Corolla small, 2-lipped; tube short; limb 5-lobed, the middle lobe of the lower lip much the largest. Stamens 4, didynamous, usually exserted; anther-cells at first parallel and pendulous, afterwards divaricate, often twisting so that the lower ends are erect. Ovary 2–4-celled; ovules 4; style filiform; stigma shortly 2-fid. Fruit a globose or ovoid drupe, invested at the base by the somewhat enlarged calyx; endocarp bony, normally 4-celled and 4-seeded, but some of the cells often suppressed. Seeds obovate or oblong; albumen 0.—DISTRIB. Species 120 in all tropical and warm temperate regions.

Panicles terminal (axillary peduncles sometimes present in the upper leaf-axils).
Shrubs or small trees.
Leaves 3- and 5-foliolate; leaflets petioluled, lanceolate. 1. *V. Negundo.*
Leaves 3-foliolate and simple; leaflets sessile, obovate-oblong ..... 2. *V. trifolia.*

A large tree; leaves usually 3-foliolate; leaflets subsessile; common petiole sometimes winged; drupe less than ½ in. in diam.	3. *V. altissima.*
Peduncles wholly axillary; leaves 3- or 5-foliolate; common petiole not winged; drupe ¾ in. long; a large tree	4. *V. leucoxylon.*

1. **Vitex Negundo,** *Linn. Sp. Pl.* (1753) p. 638. A large shrub or sometimes a small slender tree; bark thin, grey; branchlets quadrangular, whitish with a fine tomentum. Leaves 3–5-foliolate; leaflets lanceolate, acute, the terminal leaflet 2–4 by ⅝–1¼ in. with a petiolule ⅜–½ in. long, the lateral leaflets smaller with a very short petiolule, all nearly glabrous above, covered with a fine white tomentum beneath, base acute; common petioles 1–1½ in. long. Flowers in pedunculate branched tomentose cymes, opposite along the quadrangular tomentose rhachis of a large terminal often compound pyramidal panicle (axillary peduncles in the upper axils sometimes present); bracts $\frac{1}{16}$–$\frac{1}{10}$ in. long, lanceolate, caducous. Calyx ⅛ in. long, white-tomentose; teeth triangular, $\frac{1}{30}$–$\frac{1}{25}$ in. long. Corolla ⅜ in. long, bluish-purple, tomentose outside, hairy inside at the insertion of the stamens; upper lip $\frac{1}{12}$ in. long, divided to the base into 2 obtuse lobes; lower lip large, ⅕ in. long, with 2 short oblong obtuse lateral lobes $\frac{1}{16}$ in. deep, and a large broadly obovate crenulate terminal lobe ⅙ in. long. Filaments hairy at the very base. Ovary glabrous; style glabrous; stigma forked. Drupe less than ¼ in. in diam., black when ripe. Fl. B. I. v. 4, p. 583; Wight, Icon. t. 519; Trim. Fl. Ceyl. v. 3, p. 357; Talb. Trees, Bomb. ed. 2, p. 270; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 6, part 4, p. 248. *Vitex bicolor,* Willd. Enum. Hort. Berol. p. 660 (in Note); Dalz. & Gibs. p. 201. *V. trifolia,* Grah. Cat. p. 155 (*not* of Linn.).—Flowers more or less throughout the year. VERN. *Nirgud*; *Nirgundi.*

A common shrub throughout the Presidency often cultivated in gardens and for hedges. *Dalzell* without locality in Herb. Kew.!; very common along the banks of rivers and in moist situations in or near deciduous forests, *Talbot.* KONKAN: W. Ghâts, *Woodrow.* DECCAN: Mahableshwar, abundant (planted), *Cooke*! SIND: Sukkur, cultivated, *Cooke*!—DISTRIB. Throughout India; Ceylon, Afghanistan, Philippine Islands.

The leaves are agreeably aromatic when bruised and are employed in native medicine. A pillow stuffed with the leaves is placed under the head to relieve headache. The leaves are also employed as a remedy in inflammatory swellings of the joints. See Watt, Dict. Econ. Prod. l. c.

2. **Vitex trifolia,** *Linn. Sp. Pl.* (1753) p. 638. A shrub or small tree; bark smooth, pale-grey. Leaves variable, some simple and some 3-foliolate; leaflets elliptic or oblong-obovate, usually obtuse, the terminal leaflet sessile (rarely very shortly petiolulate), 2–2½ by 1–1½ in., the lateral smaller, sessile, all glabrous above, very densely white-tomentose beneath, base tapering; common petioles ½–⅝ in. long. Flowers in pedunculate tomentose cymes, opposite along the tomentose rhachis of a terminal panicle; bracts minute. Calyx ⅛ in. long in flower, white-pubescent, slightly enlarged in fruit; teeth very short, triangular, acute, sometimes obscure. Corolla pubescent outside, pale-purple, rather more than ⅜ in. long, 2-lipped; upper lip with 2 short obtuse lobes; lower lip 3-lobed, the middle lobe much the largest. Filaments hairy at the base. Drupe globose, exceeding ¼ in. in diam., purplish-black when ripe, embraced for rather more than half its length

by the veined persistent calyx; stone often 1- or 2-celled by abortion. Fl. B. I. v. 4, p. 583; Bedd. For. Man. in Flor. Sylvat. p. clxxii; Trim. Fl. Ceyl. v. 3, p. 356; Talb. Trees, Bomb. ed. 2, p. 270.—Flowers more or less throughout the year (*Talbot*). VERN. *Nirgundi*; *Lingur*.

Very closely allied to the preceding species, from which it is distinguished by the sessile obtuse leaflets, occasionally simple leaves, and rather larger flowers and fruit.

Rare. KONKAN: Goa, *Dalzell*!, *Gibson*! KANARA: sandy sea-shores near Murdeshwar, *Talbot*.—DISTRIB. Scattered throughout India in the tropical and subtropical regions; Ceylon, Japan, Philippines, N. Australia.

3. **Vitex altissima,** *Linn. f. Suppl.* (1781) p. 294. A very large tree with a dense head and somewhat drooping branches; bark grey, scaly. Leaves 3 (rarely 5) -foliolate; leaflets sessile, the terminal reaching 6 by 1¾ in., the lateral 4 by 1¼ in., lanceolate, acuminate, entire, glabrous above, more or less pubescent especially on the nerves beneath, base acute; main nerves numerous (up to 20 pairs), slender with intermediate finely reticulate venation; common petioles 2½ in. long, sometimes slightly winged. Flowers numerous in shortly pedunculate or nearly sessile cymes, clustered along the branches of large lax fulvous-pubescent terminal panicles; bracts beneath the flowers ⅛–¼ in. long, oblong, obtuse. Calyx ⅛ in. long, fulvous-villous; teeth small, 1/20 in. long, oblong, obtuse. Corolla white, tinged with blue, rather more than ¼ in. long, 2-lipped; upper lip 1/10 in. long with 2 triangular subacute lobes; lower lip ⅛ in. long, 3-lobed, the middle lobe more than twice as large as the lateral ones. Drupe irregularly globose, less than ½ in. in diam.; supported by the enlarged flattened calyx, purple, smooth, often dotted with white specks. Fl. B. I. v. 4, p. 584; Grah. Cat. p. 155; Dalz. & Gibs. p. 201; Wight, Icon. t. 1466; Bedd. Flor. Sylvat. t. 252; Trim. Fl. Ceyl. v. 3, p. 357; Talb. Trees, Bomb. ed. 2, p. 270; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 6, part 4, p. 247.—Flowers: May. VERN. *Balage*.

KONKAN: *Law*!, *Stocks*!; ravines near Nagotna, *Dalzell & Gibson*. KANARA: plentiful, *Dalzell & Gibson*; Yacombi (N. Kanara), *Woodrow*!; evergreen forests of N. Kanara, abundant in the Kumpta and Yellapur forests, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

The wood is hard and close-grained, brownish-grey, weighing 60 lbs. to the cub. ft. (*Talbot*), does not split nor warp, and polishes well. It is used for building purposes, furniture, and carts, and is in much demand in parts of N. Kanara (*Talbot*). See Watt, Dict. Econ. Prod. l. c.

VAR. *alata*, Trim. Fl. Ceyl. v. 3 (1895) p. 358. Petioles always rather broadly winged, widened and cordate at the base; leaflets very finely pubescent above, densely grey-pubescent beneath; flowers more laxly arranged. *Vitex alata* (sp.), Willd. in Ges. Naturf. Fr. Neue Schr. v. 4 (1803) p. 203; Grah. Cat. p. 155; Dalz. & Gibs. p. 201; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 584; Talb. Trees, Bomb. ed. 2, p. 271; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359.—Flowers: Apr.–May.

KONKAN: hills west of Panvel, *Nimmo* ex *Graham*. DECCAN: Limbagaon (Sattara districts), *Bhiva*! S. M. COUNTRY: Duddi, *Law* ex *Graham*. KANARA: Yellapur taluka in evergreen forests, *Talbot*.

4. **Vitex leucoxylon,** *Linn. f. Suppl.* (1781) p. 293. A large deciduous tree with spreading head; trunk thick, short; bark smooth, light-colored; young parts more or less pubescent. Leaves 3-5-foliolate (when 5-foliolate the basal pair of leaflets much smaller than the other pair); leaflets petiolulate, oblong, subobtuse, the terminal leaflet usually the largest, reaching 3–4 by 1–1¼ in., all glabrous above, pale and more or less hairy with yellowish hairs on each side of the midrib and with close reticulate venation beneath, base usually acute, often unequal-sided; petiolules ¼ in. long; common petioles 1½–2 in. long, not winged. Flowers fragrant, in axillary pedunculate lax corymbose cymes; peduncles 1–2½ in. long; bracts $\frac{1}{12}$ in. long, lanceolate, caducous. Calyx pubescent or tomentose, ⅛ in. long; teeth 5, small, triangular. Corolla ½ in. long, pubescent outside, white with purplish hairs (*Trimen*); upper lip ⅛ in. long, divided to the middle into 2 rounded lobes; lower lip 3-lobed, ⅜ in. long, nearly as broad across the 2 obtuse lateral lobes, the middle lobe broadly obovate, projecting, hairy in the centre with purplish hairs and with crisped margin. Filaments hairy at the base. Ovary densely hairy at the top with erect white hairs. Drupe ¾ in. long, succulent, obovoid, blunt, dark purple when ripe, supported on the enlarged flattened calyx; stone large, 4-celled and 4-seeded. Fl. B. I. v. 4, p. 587; Grah. Cat. p. 156; Dalz. & Gibs. p. 201; Bedd. For. Man. in Flor. Sylvat. p. clxxi; Trim. Fl. Ceyl. v. 3, p. 358; Talb. Trees, Bomb. ed. 2, p. 271; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359. *Wallrothia leucoxylon*, Roth, Nov. Pl. Sp. (1821) p. 319; Wight, Icon. t. 1467.—Flowers: Feb.–Apr. VERN. *Sheras.*

KONKAN: *Law*!; Ghâts, *Talbot*; banks of the Savitree River near Poladpur, *Graham*; Atgaon (Thâna districts), *Woodrow*! DECCAN: Khandala, *Graham*; Koina Valley below Mahableshwar, *Cooke*!; Limbagaon (Sattara districts), *Woodrow*! S. M. COUNTRY: Duddi, *Law* ex *Graham*. KANARA: N. Kanara Ghâts along the banks of rivers and nálas in moist forests, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

11. CLERODENDRON, Linn.

Trees or shrubs sometimes sarmentose. Leaves opposite, rarely 3–4-nate, simple, entire or toothed. Flowers in axillary cymes or terminal panicles often leafy below; bracts conspicuous or small; bracteoles 0. Calyx campanulate, truncate or 5-toothed or almost 5-partite, persistent, often accrescent or colored. Corolla-tube slender, usually long; limb more or less oblique, with 5 spreading lobes. Stamens 4, didynamous, much-exserted; anthers ovate or oblong, the cells parallel. Ovary imperfectly 4-celled; ovule solitary in each cell; style filiform; stigma shortly 2-fid. Fruit a globose succulent (very rarely dry) drupe, 4-grooved, separating into 4 pyrenes, of which 1–3 are sometimes suppressed. Seeds oblong; albumen 0.—DISTRIB. Chiefly in the warm regions of the Old World, a few in Tropical America; species about 100.

Cymes few-flowered, axillary, distinct; calyx slightly enlarged in fruit; a straggling or subscandent shrub..... 1. *C. inerme.*
Cymes collectively forming a terminal panicle.
  Calyx not enlarged in fruit.
    Calyx-lobes long, ovate, acuminate; leaves opposite, less than 3 in. long..... 2. *C. Phlomidis.*
    Calyx-lobes very short, broadly triangular; leaves often in whorls of 3, reaching more than 6 in. long..... 3. *C. serratum.*
  Calyx much enlarged in fruit turning red ..... 4. *C. infortunatum.*

1. **Clerodendron inerme,** *Gærtn. Fruct.* v. 1 (1788) p. 271, t. 57, fig. 1. A straggling much-branched shrub 3–7 ft. long, sometimes scandent; bark pale-brown; branches twiggy. Leaves opposite (rarely ternate), ¾–2 by ½–1 in., elliptic or obovate, obtuse, glabrous or nearly so, base acute; petioles ¼–⅜ in. long. Flowers in axillary pedunculate cymes 3–9 (commonly 3) -flowered; peduncles long, slender, ½–1¾ in. long; bracts minute, linear or subulate. Calyx ⅕ in. long, enlarged in fruit, glabrous or puberulous, somewhat leathery; teeth about $\frac{1}{20}$ in. long, triangular, acute. Corolla white; tube long, slender, reaching 1 in. long or even more, glabrous outside, very hairy inside; lobes subequal, ¼–⅜ in. long, oblong, obtuse, with slightly crenulate margins. Filaments very long, hairy at the base, much exserted. Ovary glabrous; style glabrous, much exserted; stigma acutely 2-lobed. Drupe pyriform, ½–⅝ in. long, seated in the veined persistent enlarged calyx, separating into 4 woody pyrenes. Fl. B. I. v. 4, p. 589; Grah. Cat. p. 157; Dalz. & Gibs. p. 200; Trim. Fl. Ceyl. v. 3, p. 359; Talb. Trees, Bomb. ed. 2, p. 272; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 2, p. 372.—Flowers: Nov.–Jan. VERN. *Vanjai.*

Common along the sea-coast. KONKAN: *Law!*; on the verge of high-water mark along the west face of the Island of Bombay, *Graham*; Salsette, *Graham*; Island of Bombay, *Cooke!*, *Woodrow!* GUJARAT: *Woodrow.*—DISTRIB. Throughout India near the sea; Ceylon.

2. **Clerodendron Phlomidis,** *Linn. f. Suppl.* (1781) p. 292. A large bush or small tree, reaching 30 ft. high, with more or less pubescent branches. Leaves 1½–2½ by 1¼–1½ in., ovate or subrhomboid, obtuse or acute, coarsely crenate-dentate or subentire, undulate, glabrous above, more or less puberulous beneath, base truncate or subcordate; petioles ¼–¾ in. long. Flowers moderate-sized, fragrant, in small dichotomous axillary cymes arranged so as to form a rounded terminal panicle; bracts obovate or lanceolate, acute, leafy. Calyx ⅜ in. long or more, divided about ½-way down, glabrous, not enlarged in fruit; segments ovate, acutely acuminate, veined. Corolla white or pinkish; tube ¾–1 in. long, slightly pubescent outside, glabrous inside; lobes nearly equal, exceeding ¼ in. long, elliptic, obtuse, veined. Filaments slightly pubescent below. Ovary and style glabrous. Drupe ¼ in. long, broadly obovoid, depressed, the top about level with the points of the persistent calyx-lobes, normally 4-lobed with 1 pyrene in each lobe (1–3 sometimes suppressed). Vahl, Symb. v. 2 (1791) p. 74; Trim. Fl. Ceyl. v. 3, p. 360. *Clerodendron phlomoides,* Willd. Sp. Pl. v. 3 (1800) p. 386; C. B. Clarke, in Hook. f. Fl. B. I. v. 4, p. 590; Grah. Cat. p. 157; Dalz. & Gibs. p. 200; Wight, Icon. t. 1473; Talb. Trees, Bomb. ed. 2, p. 272; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 2, p. 374.—Flowers: Aug.–Feb. VERN. *Iran.*

The name given to the plant by Linnæus f. is *C. Phlomidis* not *C. phlomoides.*

Common in hedges throughout the Presidency, especially in the drier parts. KONKAN: Thána, *Woodrow!* DECCAN: in hedges and about villages, *Graham.* S. M. COUNTRY: Padshapur, *Ritchie,* 1961!; common in the south of Dharwar and the Belgaum district, *Talbot.* GUJARAT: common in hedges, *Dalzell & Gibson*; Broach, *Kanitkar!*; Surat, *Woodrow.*—DISTRIB. Throughout India in the drier parts; Ceylon.

3. **Clerodendron serratum,** *Spreng. Syst. Veg.* v. 2 (1825) p. 758. A shrub 3–8 ft. high, scarcely woody, not much branched; stems bluntly quadrangular; young parts usually glabrous. Leaves often some ternate as well as opposite (passing into bracts above), sometimes reaching as much as 11 in. long but usually 5–6 by 2¼–2½ in., oblong or elliptic, acute, coarsely and sharply serrate (sometimes but rarely only dentate), glabrous, base acute; petioles very stout, ¼ in. long. Flowers numerous, showy, in lax pubescent dichotomous cymes, with a pair of acute bracts at each branching and a flower in the fork, each in the axil of a large leafy bract and collectively forming a long lax terminal usually pyramidal erect panicle 6–10 in. long; pedicels often twisted so as to make the large lower corolla-lobe appear uppermost; bracts ½–1½ in. long, from obovate to lanceolate, pubescent, subpersistent, often colored. Calyx ⅕ in. long, puberulous, cup-shaped, truncate, not enlarged in fruit; lobes very small, triangular, acute, ciliolate. Corolla glabrous outside, pale-blue, the large lower lobe (often appearing upper in flower) dark bluish-purple; tube ⅜ in. long, cylindric, hairy within at the insertion of the stamens, oblique at the mouth; the 2 upper and 2 lateral lobes elliptic, obtuse, flat, spreading, ⅜ in. long, the lower lobe lip-like, more than ½ in. long, concave, deflexed. Filaments much curved, densely hairy at the base. Ovary and style glabrous. Drupe ¼ in. long, somewhat succulent, broadly obovoid, normally 4-lobed with 1 pyrene in each lobe (1–3 often suppressed). Fl. B. I. v. 4, p. 592; Grah. Cat. p. 157; Dalz. & Gibs. p. 200; Wight, Icon. t. 1472; Trim. Fl. Ceyl. v. 3, p. 360; Talb. Trees, Bomb. ed. 2, p. 272; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Watt, Dict. Econ. Prod. v. 2, p. 374.—Flowers: Aug.–Sept. VERN. *Bhárang.*

KONKAN: *Stocks*! Miradonger near Pen, *Dalzell & Gibson*; Salsette, *Nimmo* ex *Graham*. DECCAN: Khandala, *Graham, Dalzell & Gibson, Bhiva*!; Mahableshwar, *Cooke*!; Kartriz Ghát, *Sirpati*!; Purandhar, *Woodrow*!—DISTRIB. More or less throughout India; Ceylon.

4. **Clerodendron infortunatum,** *Linn. Sp. Pl.* (1753) p. 637. A shrub 3–8 ft. high, often gregarious; branchlets bluntly quadrangular, clothed with yellowish silky pubescence. Leaves large, 4–10 by 3½–8 in., ovate, acuminate, thinly hairy on both sides, more strongly so on the nerves beneath, entire or denticulate, reticulately veined, base cordate or rounded; petioles 1½–4 in. long, cylindric, hairy. Flowers on rather long pubescent pedicels, in stalked cymes forming large pubescent panicles; bracts leafy, deciduous. Calyx ½ in. long in flower, much enlarged in fruit (sometimes reaching in fruit 1½ in. across the lobes when spread out), divided to within about ⅛ in. of the base, silky-pubescent; segments broadly lanceolate, very acute. Corolla densely pubescent outside, white tinged with pink; tube ¾ in. long, slender; lobes exceeding ⅜ in. long, oblong, obtuse. Filaments glabrous. Ovary and style glabrous. Drupe ⅓ in. in diam., black, nearly globose, seated on the enlarged pink calyx, containing 4–1 pyrenes. Fl. B. I. v. 4, p. 594; Grah. Cat. p. 157; Dalz. & Gibs. p. 200; Wight, Icon. t. 1471; Bedd. For. Man. in Flor. Sylvat. p. clxxiii; Trim. Fl. Ceyl. v. 3, p. 361; Talb. Trees, Bomb. ed. 2, p. 272; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Watt, Dict. Econ. Prod. v. 2, p. 373.—Flowers: Oct.–Jan. VERN. *Bhandira.*

KONKAN: Vingorla, *Dalzell & Gibson*; Belgaum and Vingorla road, *Woodrow*!; Amboli Ghát, *Kanitkar*! S. M. COUNTRY: common about Belgaum, *Graham*; Londa, *Bhiva*!; Castlerock, *Cooke*! KANARA: very common in N. Kanara, *Talbot*.—DISTRIB. Throughout India; Ceylon, Malaya.

The leaves of the plant have been used as a cheap substitute for chiretta as a tonic and antiperiodic. See Watt, Dict. Econ. Prod. l. c.

Clerodendron calamitosum, Linn. Mant. (1767) p. 90. A shrub, a native of Malacca and Java, often grown in gardens. It has elliptic leaves 4 by 2 in. and panicles of white flowers with a corolla-tube 1 in. long. The flowers appear in September and October. Fl. B. I. v. 4, p. 591; Bot. Mag. t. 5294; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360.

Clerodendron nutans, Wall. Cat. (1828) 1793. A shrub 6 ft. high, a native of Madagascar. Leaves reaching 8 in. long, narrowly obovate or lanceolate; calyx divided nearly to the base, red in fruit. Flowers white, in long drooping panicles; corolla-tube ½ in. long. Fl. B. I. v. 4, p. 591; Bot. Mag. t. 3049; Dalz. & Gibs. Suppl. p. 69; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360 & Gard. in Ind. ed. 5, p. 419.—Flowers: Aug.–Sept.

Clerodendron squamatum, Vahl, Symb. v. 2 (1791) p. 74. A shrub 2–5 ft. high, a native of China and Sumatra. Leaves broadly ovate, cordate. Flowers scarlet, in large panicles, the corolla-tube 1 in. long. Fl. B. I. v. 4, p. 593; Dalz. & Gibs. Suppl. p. 69; Woodr. Gard. in Ind. ed. 5, p. 419.

Clerodendron fragrans, R. Br. in Ait. Hort. Kew. ed. 2, v. 4 (1812) p. 63. The double-flowered variety, a native of China, is frequently cultivated in gardens. The leaves are large, wrinkled, fœtid when bruised, the flowers white merging into dark purple, very fragrant. Fl. B. I. v. 4, p. 589; Grah. Cat. p. 157; Dalz. & Gibs. Suppl. p. 69; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360 & Gard. in Ind. ed. 5, p. 419. *Volkameria fragrans*, Vent. Jard. Malm. (1803) t. 70.—Flowers: Sept.–Nov.

Clerodendron Siphonanthus, R. Br. in Ait. Hort. Kew. ed. 2, v. 4 (1812) p. 65. A shrub 4–8 ft. high, with narrowly lanceolate shortly acuminate oleander-like leaves 6 by 1 in., a native of Sikkim, Assam, and Sumatra, extensively cultivated in both hemispheres. The flowers are white, in large terminal panicles, with a fleshy curved corolla-tube 3–4 in. long. Fl. B. I. v. 4, p. 595; Grah. Cat. p. 157; Dalz. & Gibs. Suppl. p. 69; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360 & Gard. in Ind. ed. 5, p. 419.—Flowers: Sept.–Oct.

Clerodendron aculeatum, Griseb. Fl. Brit. W. I. (1861) p. 500. A shrub 5–10 ft. high, armed with short axillary spines, a native of the West Indies. It has elliptic-lanceolate leaves and small fragrant white flowers with long-exserted purple stamens. It is very suitable for fences. Fl. B. I. v. 4, p. 589; Grah. Cat. p. 157; Dalz. & Gibs. Suppl. p. 69; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360 & Gard. in Ind. ed. 5, p. 420.—Flowers: Oct.

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Clerodendron emirnense, Boj. ex Hook. Bot. Mag. (1829) t. 2925. A much-branched shrub 10–20 ft. high, with ovate or oblong-ovate smooth shining leaves and large terminal corymbs of white flowers sometimes tinged with purple, a native of Emirne in Madagascar, whence its specific name. Grah. Cat. p. 158; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360 & Gard. in Ind. ed. 5, p. 419 (by error *emirense*).—Flowers: Sept.–Oct.

Clerodendron Thomsonæ, Balf. in Edinb. New Phil. Journ. N. S. v. 15 (Jan.–Apr. 1862) p. 233. A climbing shrub, a native of Tropical Africa, with ovate leaves 3–6 in. long, a white pentagonal calyx, and light crimson corolla with tube 1 in. long. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360 & Gard. in Ind. ed. 5, p. 419.—Flowers: Sept.–Dec.

12. **SYMPHOREMA,** Roxb.

Scandent shrubs. Leaves opposite, entire or toothed. Flowers in pedunculate capitate usually 7-flowered cymes; bracts 6, oblong, involucrate, accrescent in fruit. Calyx short, obovoid, 4–8-lobed, somewhat accrescent. Corolla small, white; tube cylindric; limb with 6–16 subequal narrowly oblong lobes. Stamens 6–16 (as many as the corolla-lobes); anthers exserted, ovate, the cells parallel. Ovary 2- or imperfectly 4-celled; ovules 4; style filiform; stigma shortly 2-fid. Fruit dry, included in the calyx, 1-seeded. Seed erect; cotyledons fleshy.—DISTRIB. Species 3, a Philippine Island one and the 2 following.

Corolla $\frac{1}{4}$ in. long, 6–8-lobed	1. *S. involucratum.*
Corolla $\frac{1}{2}$ in. long or more, 12–16-lobed	2. *S. polyandrum.*

1. **Symphorema involucratum,** *Roxb. Cor. Pl.* v. 2 (1798) p. 46, t. 186. A climbing shrub; stems slender; young parts stellately tomentose. Leaves 2–3 by $1\frac{1}{4}$–$1\frac{3}{4}$ in., ovate or elliptic, subacute, crenate-serrate or toothed, glabrous above or nearly so when mature, white or pale-buff with close stellate pubescence beneath, base usually rounded; petioles $\frac{1}{5}$ in. long. Flowers crowded in about 7-flowered capitate pedunculate cymes; bracts in flower $\frac{3}{4}$ by $\frac{1}{8}$ in., lanceolate, densely pubescent or villous; bracts in fruit enlarging to $1\frac{1}{2}$ by $\frac{1}{2}$ in. and then spathulate-elliptic, thinly pubescent, submembranous, reticulately veined. Calyx $\frac{1}{6}$–$\frac{1}{5}$ in. long, stellately tomentose, slightly enlarged in fruit; lobes $\frac{1}{16}$ in. long, triangular-oblong, subacute. Corolla white, glabrous, less than $\frac{1}{3}$ in. long, 6–8-lobed; lobes $\frac{1}{8}$ in. long, linear-oblong, obtuse. Stamens inserted at the top of the corolla-tube, exserted; filaments glabrous. Ovary and style glabrous. Fruit $\frac{1}{6}$ in. in diam., subglobose, glabrous or nearly so. Fl. B. I. v. 4, p. 599; Dalz. & Gibs. p. 199; Wight, Icon. t. 362; Trim. Fl. Ceyl. v. 3, p. 363; Talb. Trees, Bomb. ed. 2, p. 273; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 837; Watt, Dict. Econ. Prod. v. 6, part 3, p. 396.—Flowers: Mar.–May.

Dalzell without locality in Herb. Kew. KONKAN: between Nagotna and Alibág, *Dalzell & Gibson*; Wassind (Thána districts), *Woodrow.* KANARA: *Law!*, *Stocks!*; moist forests near Yellapur, *Talbot*; Arbail Ghát, *Talbot*!—DISTRIB. India (W. Peninsula, Birma); Ceylon.

2. **Symphorema polyandrum,** *Wight, Icon.* (1840) t. 363. A climbing or spreading shrub, bare of leaves when in flower (*Talbot*);

young parts densely fulvous-pubescent. Leaves 3–6 by 2–4½ in., broadly ovate or suborbicular, usually acuminate, crenate-serrate or dentate, stellately hairy on both sides, base rounded; petioles ¼–¾ in. long, stout, densely pubescent. Flowers crowded in capitate pedunculate pubescent cymes; bracts in fruit reaching 1½ by 1 in., obovate-oblong, obtuse, densely pubescent. Calyx ⅜–½ in. long, white-tomentose and with fine stellate hairs, campanulate-infundibuliform in flower, enlarged and becoming somewhat urceolate-globose in fruit; teeth 6–8, triangular-oblong, subacute, ⅛ in. long. Corolla white, ⅝ in. long; tube ⅜ in. long; lobes 12–16, lanceolate, acute. Stamens as many as the corolla-lobes; filaments glabrous. Ovary and style glabrous. Fruit ¼–⅓ in. in diam., enclosed in the persistent calyx. Fl. B. I. v. 4, p. 599; Talb. Trees, Bomb. ed. 2, p. 273; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 837.—Flowers: Feb.–Mar.

Rare. S. M. Country: Belgaum, *Woodrow, Talbot, Ritchie,* 925!; Dharwar districts, *Talbot*; Gokak, *Ritchie,* 925!—Distrib. India (W. Peninsula).

13. **AVICENNIA,** Linn.

Shrubs or small trees. Leaves coriaceous, opposite, entire. Flowers small, sessile, in capitate pedunculate heads of close cymes, paired in the penultimate axils or terminal in trichotomous corymbs; bracts small. Calyx short, 5-partite, unaltered in fruit; segments ovate, imbricate. Corolla short; tube wide, cylindric, straight; lobes 4, subequal or the uppermost rather the widest. Stamens 4, inserted on the corolla-throat; filaments subequal; anthers shortly exserted, ovate, the cells parallel. Ovary imperfectly 4-celled by a 4-winged central axis; ovules 4, pendulous between the axial wings; style long or short; stigma 2-fid. Fruit a compressed capsule; valves 2, thick, leathery. Seeds solitary, erect; embryo imperfectly covered by the two integuments; cotyledons large, longitudinally plicate; radicle inferior, villous.—Distrib. Sea-shores of the warmer regions of the globe; species 4 or 5.

A tree; leaves very obtuse; capsule 1 in. and more long; stamens exserted; style long	1. *A. officinalis.*
A shrub; leaves very acute; capsule less than 1 in. long; stamens included; style short	2. *A. alba.*

1. **Avicennia officinalis,** *Linn. Sp. Pl.* (1753) p. 110. A small tree with smooth pale bark. Leaves coriaceous, 2–3 by 1–1½ in., elliptic-oblong or obovate-oblong, very obtuse, glabrous, smooth and shining above, pale and with a hard thin tomentum beneath, base acute, attenuated into the petiole; main nerves 4–6 pairs with reticulate venation between; petioles ¼–⅓ in. long. Flowers dingy yellow, sessile in small heads, on rigid angular peduncles which are often 2 together in the upper axils or several in small terminal thyrses; bract and 2 bracteoles concave, ciliate, shorter than the sepals. Calyx 5-partite almost to the base; sepals ⅛-⅛ in. long, broadly ovate or suborbicular, obtuse, concave, ciliate. Corolla ½ in. in diam.; lobes 4, ovate, acute, subequal. Stamens exserted. Ovary and style together reaching ¼ in. long, the ovary tapering into and about as long as the style, both villous; stigma shortly 2-fid. Capsules 1–1½ in. long, ovoid, compressed, beaked, green, wrinkled especially at the base (*Gammie*). Seed completely filling the fruit, often germinating on the tree. Fl. B. I. v. 4, p. 604; Bedd. For.

Man. in Flor. Sylvat. p. clxxiv & Anal. Gen. t. 22, fig. 2; Trim. Fl. Ceyl. v. 3, p. 363; Talb. Trees, Bomb. ed. 2, p. 274; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 838. *Avicennia tomentosa*, Jacq. Enum. Pl. Carib. (1760) p. 25; Grah. Cat. p. 159; Watt, Dict. Econ. Prod. v. 1, p. 361.—Flowers: Apr.–June. VERN. *Tivar.*

In creeks and salt-marshes along the coast. KONKAN: Vellard and Sion causeway (Bombay), *Graham*; Bassein, *Gammie*!, *Burkill*; Malgund near Ratnagiri, *Bhide*! KANARA: tidal rivers and creeks, *Talbot*.—DISTRIB. Throughout India in salt-marshes and tidal creeks; Ceylon, Malaya, shores of the Indian and Pacific Oceans.

The tree is often called "*The White Mangrove.*" Though the bark possesses tanning properties and is said to be used as a tanning material in Rio Janeiro, it does not seem to be so employed in India.

2. **Avicennia alba,** *Blume, Bijdr.* (1826) p. 821. A shrub; branches pale. Leaves 2–3 by $\frac{3}{4}$–1 in., lanceolate, very acute, glabrous above, whitish-tomentose beneath, base acute; petioles $\frac{1}{8}$ in. long. Flowers sessile, in heads at the apex of stout angular peduncles usually 3–4 from the last pair of leaves, less often solitary from each of a lower pair of leaves. Calyx and corolla as in the last species. Stamens included. Ovary villous, style villous, shorter than the ovary, 2-cleft. Capsules $\frac{5}{8}$–$\frac{3}{4}$ in. long, ovoid, compressed, apiculate, bright-yellow and smooth when ripe (*Gammie*). Seed often germinating on the tree. Wight, Icon. t. 1482; Prain, Beng. Pl. p. 838. *Avicennia officinalis*, Watt, Dict. Econ. Prod. v. 1, p. 360 (*not* of Linn.). *A. officinalis* var. *alba*, Hook. f. Fl. B. I. v. 5, p. 604.—Flowers: Mar.–May. VERN. *Tivar.*

KONKAN: Salsette, *Stocks*; Borivli (Salsette) near the Railway Station, *Bhide*!; Bassein, *Gammie*!, *Burkill*; Sasaunghar, near Bassein, *Ryan*!—DISTRIB. India in tidal creeks; Malaya, S.E. Asia, N. Australia.

The following non-indigenous plants of the Order are more or less grown in gardens throughout the Presidency:—

Lippia citriodora, H. B. & K. Nov. Gen. & Sp. v. 2 (1817) p. 269. A graceful shrub with pale green lanceolate ternate sweetly scented leaves and small whitish or lilac flowers in terminal panicles, a native of S. America. It was introduced into Bombay by the Earl of Clare (fide *Dalzell*) and is very common in gardens. It is known as the *Lemon-scented Aloysia* or *Lemon-scented Verbena* and is much esteemed for its fragrant leaves. *Aloysia citriodora*, Orteg. ex Pers. Syn. v. 2 (1807) p. 139; Grah. Cat. p. 154; Dalz. & Gibs. Suppl. p. 68; Woodr. Gard. in Ind. ed. 5, p. 420.

Verbena venosa, Gill & Hook. in Hook. Bot. Misc. v. 1 (1830) p. 167. A dwarf spreading herbaceous plant, a native of S. America, with stiff ascending branches, rough sessile oblong-lanceolate leaves and bluish-purple flowers. The plant flowers freely in the cold season, is easy of culture, but of no great beauty. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359 & Gard. in Ind. ed. 5, p. 421.

Verbena incisa, Hook. Bot. Mag. (1839) t. 3628. A pretty little creeping annual with irregularly and coarsely toothed leaves and rosy

flowers resembling those of the garden Verbena but smaller. Flowers during January and February and often springs up from self-sown seeds. Woodr. Gard. in Ind. ed. 5, p. 421.

Verbena officinalis, Linn. Sp. Pl. (1753) p. 20. A native of the Himalayas and Bengal, sometimes found as a weed in gardens. It has variously lobed leaves and small blue flowers in terminal spikes. Fl. B. I. v. 4, p. 565; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359; Watt, Dict. Econ. Prod. v. 6, part 4, p. 229.

The garden *Verbenas* of various colors, well known as bedding plants in England, are grown largely in gardens. They are hybrids, the principal parent of which is supposed to be *Verbena chamædryfolia*, Juss. in Ann. Mus. Par. v. 7 (1806) p. 73, a native of S. America.

Citharexylum subserratum, Sw. Prodr. Veg. Ind. Occ. v. 2 (1800) p. 1043. A shrub, a native of the W. Indies, with tetragonal branches, elliptic or obovate subserrate leaves and short axillary nodding racemes of white fragrant flowers which appear in November and December. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359.

Duranta Plumieri, Jacq. Select. Stirp. Am. (1763) p. 186. An erect bushy shrub, a native of S. America and the West Indies, with spinous branches, oblong-lanceolate acuminate leaves and blue flowers borne in great profusion in racemes at the ends of the branches, succeeded by orange-colored berries. It blooms more or less throughout the year and makes a good hedge. Fl. B. I. v. 4, p. 560; Dalz. & Gibs. Suppl. p. 70; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 359.

Holmskioldia sanguinea, Retz. Obs. fasc. 6 (1791) p. 31. A straggling shrub, a native of the subtropical Himalaya, remarkable for its large subrotately campanulate red calyx reaching 1 in. in diam. in fruit. Fl. B. I. v. 4, p. 596; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Watt, Dict. Econ. Prod. v. 4, p. 260.

Petrea volubilis, Linn. Sp. Pl. (1753) p. 626. A large climber with ovate or lanceolate scabrous leaves 3–4 in. long, a native of Tropical America. The flowers are inodorous, in copious racemes, remarkable for the large persistent purplish-blue calyx which remains long after the violet corollas have fallen off. Bot. Mag. t. 628; Dalz. & Gibs. Suppl. p. 70; Jacq. Select. Stirp. Am. p. 180, t. 114 (*Petræa* in text, *Petrea* in Tab.). *Petræa volubilis*, Woodr. Gard. in Ind. ed. 5, p. 420. The genus was named by Linnæus after Lord Petre, and should be written *Petrea* not *Petræa* (Linn. Hort. Cliff. p. 319).

Congea tomentosa, Roxb. Cor. Pl. v. 3 (1819) p. 90, t. 293, var. *azurea*, C. B. Clarke, in Hook. f. Fl. B. I. v. 4 (1885) p. 604. A large climber much cultivated in N. India and often grown in gardens in the Bombay Presidency, with elliptic acute leaves and large lilac bracts beneath the cymes. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360. *Congea azurea* (sp.), Wall. Cat. 1733; Wight, Icon. t. 1479, 1, fig. A. Dalz. & Gibs. Suppl. p. 69; Woodr. Gard. in Ind. ed. 5, p. 420.

Order XCVIII. LABIATÆ.

Herbs rarely shrubs, often gland-dotted; branches opposite or verticillate, usually 4-angled. Leaves opposite or whorled; stipules 0. Flowers hermaphrodite, irregular, solitary, 2-nate or fascicled and axillary, or in centrifugal spicate cymes which by union in pairs form false whorls; bracts small; bracteoles usually minute, opposite. Calyx inferior, gamosepalous, persistent, subregular or irregular, 4–5-fid or distinctly 2-lipped. Corolla gamopetalous; limb 4–5-lobed or distinctly 2-lipped; lobes imbricate. Stamens adnate to the corolla-tube, 4, didynamous or only 2 perfect; anther-cells connate, separate or confluent, dehiscing longitudinally. Disk prominent. Ovary superior, deeply 4-lobed; style simple from the centre of the ovary between the lobes, erect, filiform; stigma usually 2-fid, sometimes unequally; ovules solitary in each lobe of the ovary, erect, anatropous. Fruit of 4 dry (rarely fleshy) 1-seeded nutlets at the base of the calyx, sometimes 1 or more suppressed. Seed solitary in the nutlets, small, erect; albumen scanty or 0; embryo conform to the seed; radicle inferior.—Distrib. Genera about 140; species about 3000, chiefly in warm dry temperate regions.

Perfect stamens 4, declinate; anther-cells at length confluent.
Attachment of nutlets basilar.
Lower lip of corolla somewhat declinate, flat or slightly concave, generally narrower but hardly longer than the usually 4-lobed upper lip.
Fruiting calyx deflexed, the upper lobe widest, large, ovate, recurved, the margins decurrent on the tube.
Corolla-tube short; lower lip flat; stigma 2-fid ..... 1. Ocimum.
Corolla-tube usually long; lower lip concave; stigma entire ..... 2. Orthosiphon.
Fruiting calyx suberect or declinate, the upper lobe broader than the others, the margins not decurrent on the tube.
Whorls crowded in terminal and axillary globose or ovoid heads with imbricate bracts; calyx suberect ..... 3. Acrocephalus.
Whorls racemose or spicate; calyx usually declinate.
Racemes simple.
Bracts conspicuous; lower lip of calyx not inflexed ..... 4. Geniosporum.
Bracts small; lower lip of calyx inflexed ..... 5. Platystoma.
Racemes paniculate ..... 6. Moschosma.
Lower lip of corolla deflexed, concave, boat-shaped or saccate, much longer than the upper lip.
Upper lip of corolla very short, obtusely 3-4-toothed.
Calyx equally 5-toothed or somewhat 2-lipped with 3-toothed upper and 2-toothed lower lip; or with upper lobe large, rounded, reflexed, the others narrow subulate.
Filaments free ..... 7. Plectranthus.
Filaments connate at the base round the style ..... 8. Coleus.

Calyx very oblique, suberect, 2-lipped, the upper lip large, entire, inflexed and closing the mouth, the lower lip truncate, obscurely 4-toothed; or calyx 1-lipped, slit in front, the solitary lip 5-toothed, incurved, but not quite closing the calyx-mouth ..... 9. ANISOCHILUS.
Attachment of nutlets slightly oblique to the outer side, the nutlets also dorsally attached to the lobes of the disk leaving a large areole on separation; calyx-lobes subequal, tube 13–15-nerved; stamens included in the tube..... 10. LAVANDULA.
Perfect stamens 4, erect or spreading or ascending.
Corolla-lobes 4; stamens equal or subequal.
Calyx 5-toothed; stamens exserted.
Corolla-lobes unequal; whorls in glomerate or solitary interrupted spikes; filaments bearded or naked ..... 11. POGOSTEMON.
Corolla-lobes equal; whorls in slender continuous spikes; filaments bearded ..... 12. DYSOPHYLLA.
Calyx 5-partite; segments plumose; filaments naked, included ..... 13. COLEBROOKEA.
Corolla 2-lipped; stamens didynamous.
Lower pair of stamens the longer.
Calyx 13-nerved, equally 5-toothed; anthers 2-celled, the cells short..... 14. MICROMERIA.
Calyx 5–10-nerved.
Upper lip of corolla short, nearly flat; stamens exserted, the anther-cells of upper dimidiate, of the lower pair transverse..... 15. ANISOMELES.
Upper lip of corolla hooded.
Upper lip of corolla not woolly; calyx 2-lipped with a broad plate at the back, the mouth closed after flowering..... 16. SCUTELLARIA.
Upper lip of corolla densely woolly.
Calyx 5-toothed, the teeth spinescent; stamens more or less exserted; anther-cells parallel ..... 17. LEONURUS.
Calyx 6–10-toothed; stamens included; anther-cells divergent.
Lower lip of corolla longer than the upper ..... 18. LEUCAS.
Lower lip of corolla shorter than the upper ..... 19. LEONOTIS.
Upper pair of stamens the longer; calyx tubular, 15-nerved, 5-toothed; stamens included ..... 20. NEPETA.
Perfect stamens 2 (the lower pair) ascending or erect; anthers with a long linear transverse connective articulated with the filament; calyx 2-lipped, 5-nerved ..... 21. SALVIA.

1. OCIMUM, *Linn.*

Strongly scented herbs, shrubs, or undershrubs. Flowers small, in 6–10-flowered whorls, spicate or racemose; pedicels with recurved tips; bracts small, caducous. Calyx ovoid or campanulate, deflexed in fruit, 2-lipped; upper lip broad, flat, decurrent, erect in fruit; lower lip usually with 4 mucronate teeth, the 2 middle the largest. Corolla 2-lipped; tube short, not annulate within; upper lip subequally 4-fid; lower lip hardly longer than the upper, declinate, entire, flat or nearly so. Stamens 4, didynamous, declinate, exserted; filaments free or the lower pair connate below, naked, or the upper toothed or hairy below; anther-cells confluent. Disk entire or 3–4-lobed. Ovary 4-partite; style-lobes subulate or flattened. Nutlets 4, dry, smooth or subrugose,

mucilaginous when moistened, enclosed in the enlarged membranous veined strongly recurved calyx. — DISTRIB. Throughout the warmer regions of both hemispheres; species 60.

Pedicels as long as or longer than the calyx; 2 lower calyx-teeth longer than the upper lip	1. *O. sanctum.*
Pedicels shorter than the calyx.	
Lower calyx-teeth longer than the upper lip.	
Bracts stalked	2. *O. canum.*
Bracts sessile	3. *O. adscendens.*
Lower calyx-teeth shorter than the upper lip	4. *O. gratissimum.*

1. **Ocimum sanctum,** *Linn. Mant.* v. 1 (1767) p. 85. Annual, 1–2 ft. high, much branched; stems and branches usually purplish, subquadrangular, sometimes woody below, clothed with soft spreading hairs. Leaves 1–2 by $\frac{5}{8}$–$1\frac{1}{4}$ in., elliptic-oblong, obtuse or acute, entire or serrate, pubescent on both sides, minutely gland-dotted, base obtuse or acute; petioles $\frac{1}{2}$–1 in. long, slender, hairy. Flowers in racemes 6–8 in. long in close whorls; bracts nearly $\frac{1}{8}$ in. long and almost as broad as long, broadly ovate with a long slender acumen, ciliate; pedicels longer than the flowering calyx, slender, pubescent. Calyx $\frac{1}{8}$–$\frac{1}{6}$ in. long in flower, pubescent, reaching $\frac{1}{5}$ in. long in fruit; upper lip broadly obovate or suborbicular, much reflexed, very shortly apiculate; lower lip longer than the upper, the teeth lanceolate at the base, the 2 lateral with short straight, the 2 central with long slender awns which project beyond the upper lip and are much curved upwards. Corolla $\frac{1}{6}$ in. long, purplish; upper lip pubescent on the back. Stamens exserted; filaments slender, the upper pair with a small bearded appendage at the base. Nutlets $\frac{1}{20}$ in. long, broadly ellipsoid, nearly smooth, yellow with small black markings. Fl. B. I. v. 4, p. 609: Grah. Cat. p. 147; Dalz. & Gibs. p. 204; Trim. Fl. Ceyl. v. 3, p. 366; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 842; Watt, Dict. Econ. Prod. v. 5, p. 443.—VERN. *Tulshi*; *Tulas*; *Kâla-tulshi.*

The *Holy Basil*, the most sacred plant in the Hindu religion, very doubtfully indigenous. It is grown in or near almost every Hindu house and in temples. The Brahmins hold it sacred to the gods Krishna and Vishnu. The leaves have expectorant properties, and their expressed juice is employed for a variety of purposes in native medicine. See Watt, Dict. Econ. Prod. l. c.—DISTRIB. Throughout India (cultivated but doubtfully indigenous); Malay Archipelago, Australia, W. Asia, Arabia.

2. **Ocimum canum,** *Sims, in Bot. Mag.* (1824) t. 2452. Herbaceous, 6–24 in. high, much branched; stems and branches subquadrangular, striate, the younger pubescent. Leaves 1–$1\frac{1}{2}$ by $\frac{3}{8}$–$\frac{1}{2}$ in., elliptic-lanceolate, acute at both ends, glabrous or nearly so, entire or shallowly serrate, gland-dotted; petioles $\frac{1}{2}$–1 in. long, slender, hairy. Flowers in rather close whorls, about 6 in a whorl, in spiciform racemes 3–8 in. long; bracts elliptic-lanceolate, stalked, ciliate with long white hairs; pedicels shorter than the calyx, sometimes almost 0. Calyx pubescent, $\frac{1}{8}$ in. long; upper lip suborbicular, rather broader than long, flat, shortly mucronate, reticulately veined, ciliate; lower lip with 4 lanceolate-subulate teeth, the 2 central teeth longer than the lateral and exceeding the upper lip of the calyx. Corolla $\frac{1}{6}$ in. long, white; upper lip broadly oblong, 4-toothed at the subtruncate apex, $\frac{1}{10}$–$\frac{1}{8}$ in. broad; lower lip longer than the upper, $\frac{1}{20}$ in. broad, oblong, obtuse. Stamens much

exserted; filaments slender, the 2 upper with a tooth at the base. Style exserted beyond the filaments. Nutlets $\frac{1}{20}$ in. long, ellipsoid, black. Fl. B. I. v. 4, p. 607; Grah. Cat. p. 147; Dalz. & Gibs. p. 203; Trim. Fl. Ceyl. v. 3, p. 365; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 842; Watt, Dict. Econ. Prod. v. 5, p. 442.—Flowers: July–Dec. VERN. *Rán-tulshi.*

The *Hoary Basil*, abundant about native gardens. Dalzell & Gibson (*l. c.*) say that Africa is supposed to be its native country. KONKAN: *Stocks*! DECCAN: widely, *Woodrow*; Poona, *Cooke*! S. M. COUNTRY: hills N.E. of Belgaum, *Ritchie* $\frac{548}{2}$!—DISTRIB. Plains and lower hills of India; Ceylon, Java, W. Asia, Tropical Africa, Madagascar, cultivated in America.

3. **Ocimum adscendens,** *Willd. Sp. Pl.* v. 3 (1800) p. 166. Annual, 6–15 in. high, erect, or prostrate with ascending branches. Leaves ½–1 by ¼–½ in., oblong, obtuse, entire or faintly serrate, glabrous, much gland-dotted, base tapering; petioles ⅛–⅜ in. long. Flowers in short racemes, the whorls distant; bracts reaching ½ by $\frac{1}{20}$ in., linear-oblong-lanceolate with a small gland at the base; pedicels shorter than the calyx. Corolla ⅛ in. long. Upper filaments with a dilated appendage at the base. Nutlets $\frac{1}{16}$ in. in diam.; subglobose, compressed, smooth, yellowish-brown. Fl. B. I. v. 4, p. 609; Dalz. & Gibs. p. 203; Trim. Fl. Ceyl. v. 3, p. 366; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360.

I have seen no specimens of this plant from the Bombay Presidency. Though it has been often sought for, none of the plant collectors attached to the Poona College of Science have, so far as I know, succeeded in obtaining it. Woodrow, in his list above cited, merely quotes Dalzell, who states (Bomb. Flor. l. c.) that it is common all over India, which is clearly a mistake. There are no specimens in Dalzell's Herbarium in Herb. Kew. The plant occurs in S. India and sparingly in Ceylon and is also given for Jubbulpore.

4. **Ocimum gratissimum,** *Linn. Sp. Pl.* (1753) p. 1197. Shrubby, perennial, 4–6 ft. high, much branched, woody below; stem and branches subquadrangular, the young ones pubescent. Leaves 2½–5 by 1½–2¼ in., elliptic-lanceolate, acute, coarsely crenate-serrate, pubescent on both sides, gland-dotted, base cuneate; petioles 1–2½ in. long, slender, more or less pubescent. Flowers in simple or branched rather short racemes, in tolerably close whorls; rhachis quadrangular, softly pubescent; bracts sessile, longer than the calyx, acuminate from a broad ovate base, decussate and squarrose in the young inflorescence, ciliate; pedicels shorter than the calyx, softly pubescent. Calyx ⅛ in. long in flower, becoming twice as long in fruit, pubescent and glandular; upper lip rounded, veined, scarcely mucronate, curved upwards in fruit, longer than the lower; lower lip strongly nerved, the 2 central teeth short, subulate, the lateral teeth shorter and broader, lanceolate. Corolla ⅛ in. long, pale greenish-yellow, pubescent outside; upper lip ⅛ in. broad with 4 rounded teeth; lower lip longer than the upper, $\frac{1}{20}$ in. broad. Stamens exserted; upper filaments with a bearded tooth at the base. Nutlets $\frac{1}{16}$ in. in diam. subglobose, rugose, brown. Fl. B. I. v. 4, p. 608; Grah. Cat. p. 147; Dalz. & Gibs. p. 203; Jacq. Icon. Pl. Rar. v. 3, t. 495; Trim. Fl. Ceyl. v. 3, p. 367; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 842; Watt, Dict. Econ. Prod. v. 5, p. 443.—Flowers: July–Oct. VERN. *Rám-tulshi, Máli-tulshi.*

Doubtfully indigenous. KONKAN: *Law*! DECCAN: Poona, *Cooke*!; Nasik, *Woodrow*!, *Wadthekar*! S. M. COUNTRY: Belgaum, *Ritchie*, 548! GUJARAT: Balsar, *Kanitkar*!—DISTRIB. Throughout India, often cultivated; Ceylon, Java.

Ocimum basilicum, Linn. Sp. Pl. (1753) p. 597. A widely cultivated plant known as the *Sweet Basil*, not indigenous in the Bombay Presidency but said to be so in the Panjáb on low hills. The typical form is generally quite smooth with green stems and white flowers, the 2 middle teeth of the lower lip of the calyx awned, longer than the rounded upper lip, the corolla sometimes ½ in. long, shortly pedicellate, the nutlets pitted. Fl. B. I. v. 4, p. 608; Grah. Cat. p. 147; Dalz. & Gibs. p. 203; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 842; Watt, Dict. Econ. Prod. v. 5, p. 440.

VAR. *thyrsiflora*, Benth. Lab. Gen. et Sp. p. 5. Of many described varieties, most of which are, according to Sir J. D. Hooker (Fl. B. I. l. c.), not distinguishable by any constant characters, the above seems to be the most important in the Bombay Presidency. It has purple stems and pink flowers in thyrsoid racemes.—VERN. *Sabjá*; *Kámakasturi*.

The plant has a strong aromatic flavor, and is employed as a seasoning for culinary purposes. The seeds are used medicinally by the natives in many parts of India. See Watt, Dict. Econ. Prod. l. c.

2. **ORTHOSIPHON,** Benth.

Undershrubs or shrubs. Flowers racemose in 6- or fewer-flowered whorls; bracts small. Calyx ovoid, campanulate or tubular, deflexed in fruit; upper tooth broad, membranous, the margins decurrent on the tube; lateral and lower teeth distinct or shortly connate, usually subulate. Corolla 2-lipped; tube often slender, straight or incurved; upper lip 3–4-fid; lower entire, concave. Stamens 4, declinate, didynamous; filaments free, not appendaged at the base; anther-cells confluent. Disk usually gibbous. Ovary 4-partite; style with a small capitate or clavate entire or notched stigma. Fruit of 4 dry ovoid or globose nutlets, smooth or nearly so; basal scar small.—DISTRIB. Warmer regions of the Old World; species about 60.

Corolla-tube nearly equalling the calyx	1. *O. pallidus.*
Corolla-tube longer than the calyx	2. *O. tomentosus* var. *glabrata.*

1. **Orthosiphon pallidus,** *Royle, MSS. ex Benth. in Hook. Bot. Misc.* v. 3 (1833) p. 370. A low undershrub 6–12 in. high; branches numerous from a woody rootstock, quadrangular, more or less finely pubescent. Leaves inodorous, ½–1½ by ⅜–⅞ in., ovate, usually obtuse, crenate or serrate, glabrous or nearly so, gland-dotted, base shortly cuneate; petioles ⅛–⅜ in. long. Flowers in rather short racemes, the whorls 6-flowered, distant; bracts $\frac{1}{25}$ in. long, hairy; pedicels about equalling the flowering calyx, pubescent. Calyx in flower ⅛ in. long, twice as long in fruit, the lower part hairy; upper lip with 3 obtuse lobes, the middle lobe widest; lower lip strongly parallel-nerved, membranous, the 2 central teeth with a long up-curved awn from a narrow lanceolate base, longer than the upper lip, the lateral teeth broadly lanceolate with a short straight awn. Corolla ¼ in. long,

white or pale lilac; tube nearly as long as the calyx; upper lip shorter than the suborbicular concave lower lip. Stamens included or scarcely exserted beyond the lower lip. Stigma clavate. Nutlets $\frac{1}{16}$ in. in diam., subglobose, smooth, yellowish-brown. Fl. B. I. v. 4, p. 613; Dalz. & Gibs. p. 205; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 844.—Flowers: June–Oct.

DECCAN: common, *Dalzell & Gibson, Woodrow*; Bowdhan near Poona, *Kanitkar*!; Rajwade, *Kanitkar*! S. M. COUNTRY: Belgaum, *Ritchie*, 1975!—DISTRIB. Throughout the greater part of India; Beluchistan, Arabia.

2. **Orthosiphon tomentosus,** *Benth. in Wall. Pl. As. Rar.* v. 2 (1831) p. 14. VAR. **glabrata,** *Hook. f. Fl. B. I.* v. 4 (1885) p. 614. Stems 1–2 in. long, woody at the base, slender, branched, sharply quadrangular, glabrous or nearly so. Leaves $1\frac{1}{2}$–3 by $\frac{3}{4}$–$1\frac{3}{4}$ in., ovate, acute, coarsely serrate, glabrous, base usually acute; petioles slender, $\frac{1}{2}$–$1\frac{1}{2}$ in. long. Flowers in racemes 3–8 in. long, in rather distant whorls; bracts ovate, acute, $\frac{1}{12}$ in. long. Calyx in flower $\frac{1}{4}$ in. long, glabrous or slightly pubescent, often tinged with purple; upper lip obovate-oblong, often mucronate; the two middle teeth of the lower lip lanceolate, with a long slightly curved awn, exceeding the upper lip, the lateral teeth shorter, lanceolate, with a short straight awn. Corolla variable in length, sometimes reaching $\frac{1}{2}$ in. long, slightly pubescent outside, pale-purple, inodorous; tube much longer than the calyx; upper lip with three obtuse lobes, the middle lobe the widest, shorter than the obovate-oblong obtuse concave lower lip. Stamens included. Stigma small, subclavate, sometimes slightly notched. Nutlets $\frac{1}{16}$ in. long, ellipsoid or subglobose, minutely tuberculate, brown. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360. *Orthosiphon glabratus* (sp.), Benth. in Wall. Pl. As. Rar. v. 2 (1831) p. 14; Dalz. & Gibs. p. 205; Trim. Fl. Ceyl. v. 3, p. 369.—Flowers: Apr.–Sept.

KONKAN: *Law*!, *Stocks*! DECCAN: Neral, *Woodrow*. S. M. COUNTRY: Bede (borders of Kanara), *Ritchie*, 1976! GUJARAT: Pali, *Woodrow*.—DISTRIB. India (W. Peninsula); Ceylon.

3. **ACROCEPHALUS,** Benth.

Perennial or annual herbs. Leaves opposite or whorled. Flowers very small, sessile or nearly so, in approximated whorls forming a terminal or axillary globose or ovoid head with imbricate bracts. Calyx 2-lipped, ovoid, tubular in fruit, base gibbous; upper lip usually entire; lower lip entire, emarginate or 4-toothed. Corolla small, somewhat 2-lipped; tube short; upper lip subequally 4-lobed; lower lip entire, nearly flat, scarcely longer than the upper. Stamens 4, didynamous, declinate; filaments free, filiform, not appendiculate at the base. Disk small. Ovary 4-partite; style shortly 2-fid at the stigmatose tip. Fruit of 4 smooth dry nutlets; basal scar small.—DISTRIB. Tropical and Subtropical Asia, Tropical and S. Africa; species about 40.

1. **Acrocephalus capitatus,** *Benth. in Wall. Pl. As. Rar.* v. 2 (1831) p. 18. A slender annual with simple or branched stems; stems and branches obtusely quadrangular, glabrous or nearly so. Leaves $\frac{1}{2}$–$1\frac{1}{4}$ by $\frac{1}{6}$–$\frac{1}{2}$ in., ovate or lanceolate, subacute, coarsely serrate, glabrous, base tapering into the petiole; petioles often obscure owing to the decurrent leaf-blade. Flowers in terminal globose or cylindric heads

¼–¾ in. long, often with 2 spreading leaves at the base, on slender quadrangular peduncles; bracts beneath the approximated whorls broadly obovate, shortly acuminate and with cuneate base, shorter than the fruiting calyx. Calyx in flower $\frac{1}{10}$ in., in fruit ⅛ in. long, pubescent outside; upper lip oblong, entire, rounded at the apex; lower lip with 4 lanceolate teeth, shorter than the upper lip. Corolla ⅛ in. long, pale-purple. Nutlets $\frac{1}{30}$ in. long, oblong-ellipsoid, compressed, smooth, brownish-black. Fl. B. I. v. 4, p. 611; Grah. Cat. p. 158; Dalz. & Gibs. p. 204; Hook. Icon. Pl. t. 456; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 844.—Flowers: Oct.

KONKAN: *Stocks*!; Mira hills near Pen, *Dalzell & Gibson*; Mahar (sparingly), *Dalzell & Gibson*; Poladpur, *Woodrow*; Vingorla, *Woodrow*. S. M. COUNTRY: *Law* ex *Graham*; Belgaum, *Ritchie*, 1794!; Londa, *Cooke*! KANARA: *Thomson*.—DISTRIB. Throughout India chiefly in hilly districts; Java, Borneo.

4. GENIOSPORUM, Wall.

Erect or procumbent glabrous or pubescent herbs. Flowers small, in many-flowered whorls forming long terminal spicate racemes; bracts often colored. Calyx ovoid in flower, tubular in fruit, suberect or declinate; upper tooth broadest, flat, obtuse, not decurrent; lateral pair of teeth free or connate with the upper; lowest pair free or connate. Corolla 2-lipped; tube short; upper lip 4-fid; lower lip declinate, entire. Stamens 4, didynamous, declinate; filaments free, inappendiculate. Disk swollen, gibbous. Ovary 4-partite; style shortly 2-fid, the arms flattened. Fruit of 4 dry ovoid or oblong, smooth or punctulate nutlets.—DISTRIB. Tropical Asia, Africa, Madagascar; species 10 or 12.

1. **Geniosporum prostratum,** *Benth. in Pl. As. Rar.* v. 2 (1831) p. 18. Annual; stems many from a woody rootstock, slender, either diffuse, ascending, prostrate and rooting, or quite erect, glabrous or more or less hispid with weak deflexed hairs. Leaves in distant pairs, 1–2 by ⅓–¾ in., subsessile, obovate-lanceolate or linear-lanceolate, acute or subacute, shallowly serrate or distantly toothed, with a few hairs on both sides, base tapering. Flowers minute, in many-flowered close or distant whorls, in slender racemes 2–6 in. long; bracts ⅛ in. long, thick, broadly ovate, acuminate, pubescent, gland-dotted; pedicels usually longer than the calyx. Fruiting calyx ⅛ in. long, hairy outside and with a ring of hairs in the throat; upper lip variable in size, oblong, subtruncate, mucronate; lateral teeth triangular, acute; the 2 lower teeth lanceolate, awned. Corolla pink or white, ⅛ in. long, hairy; tube $\frac{1}{16}$ in. long; upper lip with 4 triangular teeth; lower lip obovate, obtuse, rather longer than the upper. Stamens exserted. Nutlets $\frac{1}{30}$ in. long, ellipsoid, compressed, smooth, brownish-black. Fl. B. I. v. 4, p. 610; Grah. Cat. p. 148; Trim. Fl. Ceyl. v. 3, p. 368; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Prain, Beng. Pl. p. 845.

This is given on the authority of Graham (Cat. Bo. Pl. l. c.), who mentions its occurrence in the S. Konkan on the authority of Nimmo. I have seen no specimens from the Bombay Presidency; there are none from that Presidency in Herb. Kew. Dalzell does not include it in his Bombay Flora, and Woodrow in his list of Bombay plants merely cites Nimmo. It occurs in S. India and is common in Ceylon.—DISTRIB. India (W. Peninsula); Ceylon.

5. **PLATYSTOMA,** Beauv. (*Platostoma*).

Small annuals. Flowers minute in terminal slender spicate racemes; whorls 6–10-flowered; bracts small, caducous. Calyx ovoid-campanulate, deflexed in fruit, 2-lipped, the lips separated by a broad sinus; upper lip ovate, not decurrent, with a tooth at each side near the base; lower lip ovate, entire, obtuse or subtruncate, inflexed. Corolla-tube very short, widely campanulate at the mouth; upper lip broad, 4-fid; lower lip scarcely longer, entire, slightly concave. Stamens 4, declinate, included; filaments free, dilated at the base, inappendiculate; anther-cells confluent. Disk swollen, gibbous. Ovary 4-partite; style shortly 2-fid at the apex. Fruit of 4 ovoid nutlets.—DISTRIB. India and Tropical Africa; species 2.

1. **Platystoma africanum,** *Beauv. Fl. Ow. & Ben.* v. 2 (1808) p. 61, t. 95, fig. 2 (*Platostoma*). An erect annual 6–12 in. high; stems weak, quadrangular, glabrous or slightly pubescent, simple or branched. Leaves ½–1¼ by ⅜–¾ in., ovate, acute, serrate, glabrous or nearly so, base tapering into the petiole. Flowers in moderately dense racemes 2–5 in. long, about 10 in a whorl; bracts $\frac{1}{10}$ in. long, deltoid-ovate, acute; pedicels about $\frac{1}{12}$ in. long. Fruiting calyx $\frac{1}{10}$ in. long; upper lip rounded, sometimes apiculate at the apex, with an obtuse tooth at each side near the base; lower lip shorter and narrower than the upper, obovate-oblong, rounded or subtruncate, inflexed. Corolla scarcely longer than the calyx, pale-lilac. Nutlets $\frac{1}{30}$ in. long, ovoid, black when ripe, minutely reticulate. Baker, in Dyer, Fl. Trop. Afr. v. 5, p. 349; Briquet, in Engl. & Prantl, Pflanzenf. v. 4, 3 A, p. 370, fig. 106, O, P, Q. *Platystoma flaccidum,* Benth. in Benth. & Hook. Gen. Pl. v. 2, p. 1173; Hook. f. Fl. B. I. v. 4, p. 611; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360.

Rare. KONKAN: *Stocks*! KANARA: Mulas, *Dalzell*!; on the Kála naddi, *Ritchie,* 1973!; Birchi forest, *Talbot,* 1311!—DISTRIB. India (W. Peninsula); Tropical Africa.

6. **MOSCHOSMA,** Reichb.

Annual or perennial herbs. Leaves petiolate, crenate. Flowers small, in subsecund 6–10-flowered whorls in axillary and terminal paniculate racemes; bracts small. Calyx ovoid or campanulate; upper tooth or 3 upper teeth larger than the 4 or 2 lower, not decurrent; throat naked. Corolla 2-lipped; upper lip 4-lobed, the lobes subequal or the 2 middle ones rather longer; lower lip entire, longer than the upper. Stamens 4, didynamous, declinate; filaments filiform, free, inappendiculate; anther-cells confluent. Disk uniform or somewhat swollen in fruit. Ovary 4-partite; style clavate-capitate, 2-fid at the tip. Fruit of 4 compressed smooth dry nutlets; basal scar small.—DISTRIB. Tropical Asia, Africa and Australia; species 6.

1. **Moschosma polystachyum,** *Benth. in Wall. Pl. As. Rar.* v. 2 (1831) p. 13. Annual; stem erect, 2–3 ft. high, much branched, sharply quadrangular, glabrous. Leaves ¾–1¾ by ⅜–1 in., ovate, acuminate, obtuse or subacute, apiculate, irregularly crenate-serrate, glabrous, base rounded or subcordate, narrowed into a slender petiole as long as the blade. Flowers shortly pedicellate, in numerous whorls closely placed and forming slender shortly pedunculate spicate racemes

arranged in large panicles; bracts $\frac{1}{20}$ in. long, lanceolate, acute, caducous; pedicels about $\frac{1}{20}$ in. long. Calyx in flower $\frac{1}{12}$–$\frac{1}{8}$ in. long, in fruit nearly $\frac{1}{8}$ in. long, pubescent outside; upper lip broad, sub-orbicular, entire, reflexed; lower lip with 4 lanceolate acute teeth, longer than the upper lip. Corolla $\frac{1}{10}$–$\frac{1}{8}$ in. long, pale-pink or flesh-colored. Nutlets scarcely $\frac{1}{30}$ in. long, broadly ellipsoid, compressed, smooth, brown. Fl. B. I. v. 4, p. 612; Dalz. & Gibs. p. 204; Trim. Fl. Ceyl. v. 3, p. 369; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360; Briquet, in Engl. & Prantl, Pflanzenf. v. 4, 3A, p. 370, fig. 106, T; Prain, Beng. Pl. p. 845.—Flowers: Nov.

Stocks without locality in Herb. Kew. KONKAN: *Law*! GUJARAT: Ahmedabad, *Cooke*!, *Bhiva*!, *Woodrow*; Neriad, *Bhiva*!, *Woodrow*!—DISTRIB. India (Bengal, Behar, Birma, W. Peninsula); Ceylon, Java, China, Philippine Islands, Tropical Africa and N. Australia.

7. **PLECTRANTHUS,** L'Hérit.

Herbs or undershrubs. Flowers usually small in lax (rarely close) paniculate or racemose usually few-flowered cymes. Calyx usually 2-lipped, enlarged in fruit; lobes 5, subequal or the upper widest. Corolla 2-lipped; tube exserted, long or short, straight or decurved, the throat equal or obliquely swollen; upper lip usually short, broad, 4-fid, recurved; lower lip much longer, entire, boat-shaped, stipitate or narrowed at the base. Stamens 4, didynamous, declinate; filaments simple, free; anther-cells usually confluent. Disk usually enlarged in fruit. Ovary 4-partite; style subequally 2-fid. Fruit of 4 orbicular ovoid or oblong smooth granulate or punctate dry nutlets; basal scar small.—DISTRIB. Tropical and Subtropical Asia, Africa, Australia, Polynesia; species reaching perhaps 100.

Fruiting calyx indistinctly 2-lipped, shortly subequally 5-toothed.
Annual, reaching 2 ft. high; leaves with short stiff scattered hairs beneath ..... 1. *P. Stocksii.*
Perennial, reaching 5 ft. high; leaves white-tomentose beneath... 2. *P. Coetsa.*
Fruiting calyx distinctly 2-lipped; upper lip broad, rounded ..... 3. *P. incanus.*

1. **Plectranthus Stocksii,** *Hook. f. Fl. B. I.* v. 4 (1885) p. 618. Annual, erect, slender, 1–2 ft. high; stems quadrangular, simple or branched, glabrous or sparsely hairy. Leaves thinly membranous, 2–4 by 1$\frac{1}{4}$–1$\frac{7}{8}$ in., ovate, acute, coarsely serrate, gland-dotted, with short scattered stiff hairs above and on the nerves beneath, base rounded, truncate or cuneate; petioles $\frac{1}{4}$–2 in. long. Flowers in branched cymes forming a large pyramidal panicle; bracts at the forks of the cyme minute; ultimate pedicels filiform, pubescent, often $\frac{1}{4}$ in. long. Calyx pubescent, covered with red or orange minute waxy glands, in flower small, $\frac{1}{20}$ in. long, much enlarged in fruit, reaching sometimes when the fruit is fully ripe $\frac{1}{6}$ in. long, incurved, striate, obscurely 2-lipped, with 5 subacute teeth. Corolla $\frac{1}{4}$ in. long, white with purple spots; tube broad, straight. Stamens exserted. Nutlets $\frac{1}{20}$ in. long, broadly ellipsoid, smooth, yellowish-brown. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360. *Plectranthus Wightii,* Grah. Cat. Bomb. Pl. p. 148 (*not* of Benth.); Dalz. & Gibs. p. 205; Woodr. in Journ. Bomb. Nat. l. c.—Flowers: Sept.–Nov.

KONKAN: *Stocks*!, *Law*! DECCAN: Mahableshwar, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*!; Párva Ghát, *Ritchie*, 1978!; Castlerock, *Cooke*!; Londa, *Woodrow*; Rámghát, *Law* ex *Dalzell & Gibson*. KANARA: Kála naddi above Supa, *Ritchie*, 1978!—DISTRIB. India (W. Peninsula).

2. **Plectranthus Coetsa,** *Buch.-Ham. ex D. Don, Fl. Nep.* (1825) p. 117. A tall erect much-branched strong-smelling perennial herb 3–5 ft. high; stems stout, quadrangular, often tinged with red and as well as the branches softly pubescent or tomentose. Leaves 1½–4 by ⅞–1¾ in., ovate, acute, serrate-dentate, softly pubescent above, white-pubescent or white-tomentose beneath, base tapering into the petiole; main nerves and reticulate venation conspicuous beneath; petioles ¼–½ in. long, stout, woolly. Flowers in numerous short cymes, in long axillary and terminal pubescent racemose panicles; pedicels slender, deflexed, pubescent. Calyx in flower $\frac{1}{12}$–$\frac{1}{10}$ in. long, hoary-pubescent, in fruit ⅛ in. long, 10-ribbed; tube cylindric, curved upwards below the limb; teeth subequal, ovate-deltoid, acute. Corolla ⅙–⅕ in. long, pale violet, pubescent outside; tube deflexed; upper lip shorter than the tube, broad, erect with shallow rounded lobes; lower lip longer than the upper, boat-shaped. Stamens included within the lower lip of the corolla. Nutlets $\frac{1}{20}$ in. long, broadly ellipsoid or suborbicular, compressed, smooth, yellow. Fl. B. I. v. 4, p. 619. *Plectranthus menthoides*, Benth. in Wall. Pl. As. Rar. v. 2 (1831) p. 17; Hook. f. Fl. B. I. v. 4, p. 620; Trim. Fl. Ceyl. v. 3, p. 372; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 360. *P. Macraei*, Benth. Lab. p. 42; Wight, Icon. t. 1430 (by error in Tab. *Pleibianthus*).—Flowers: Dec.–Feb.

Rare. KONKAN: *Stocks!* DECCAN: Panchgani, *Woodrow!*; Sinhagad, *Woodrow!*—DISTRIB. India (temperate and subtropical Himalaya, Khasia Mountains, Birma, W. Peninsula); Ceylon.

3. **Plectranthus incanus,** *Link, Enum. Hort. Berol.* v. 2 (1822) p. 120. An erect finely pubescent herb, 1–2½ ft. high; stem thick and fleshy below. Leaves 2–4½ in. long and nearly as broad as long, broadly ovate, acute, crenate, slightly pubescent or nearly glabrous above, pubescent beneath, base deeply cordate; petioles 1–3 in. long, finely pubescent. Flowers in few-flowered cymes sometimes reduced to a single flower, in racemes 3–8 in. long sometimes paniculately branched below; peduncles of the cymes very short or almost 0; bracts small, ovate, cuneate; pedicels in flower ⅛–⅙ in. long, lengthened in fruit, finely pubescent. Calyx in flower ⅙ in. long, in fruit exceeding ⅜ in. long to top of longest lower tooth, conspicuously pubescent on the nerves; upper lip broad, erect, rounded, entire, much shorter than the lower teeth, reticulately veined; lower lip 4-toothed, the teeth veined, lanceolate, with subulate points, the 2 lower longer than the 2 lateral. Corolla ⅓ in. long, pale-lilac or light-blue; tube decurved about the middle; lobes of the upper lip very shallow, rounded; lower lip boat-shaped, about ⅙ in. long. Stamens included within the lower lip. Nutlets subglobose, nearly $\frac{1}{10}$ in. in diam., pale-brown dotted with dark purple-brown spots, smooth. Bentham (Lab. p. 36) erroneously describes the root as tuberous (see N. E. Brown, in Kew Bull. 1894, p. 13). Fl. B. I. v. 4, p. 621; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 846. *Plectranthus cordifolius*, Don, Prodr. (1821) p. 116; Grah. Cat. p. 148; Dalz. & Gibs. p. 205.—Flowers: Sept.–Oct. VERN. *Lál-ágáda.*

KONKAN: Savantvadi, *Stocks!*, *Dalzell & Gibson*; Dapoli, *Nairne.* DECCAN: Khandala, *Graham*, *Woodrow*, *Dalzell & Gibson*; Bowdhan 8 miles from Poona, *Cooke!*, *Kanitkar!*; Pashan near Poona, *Ranade!* S. M. COUNTRY: Belgaum, *Ritchie*, 547!—DISTRIB. More or less throughout India especially on the hills.

Doubtful Species.

PLECTRANTHUS ROTUNDIFOLIUS, Grah. Cat. Bo. Pl. (1839) p. 148, which J. Graham on Nimmo's authority mentions as being found in the Konkans, has not been absolutely identified. Dalzell & Gibson (Bo. Fl. p. 205) make no mention of the tubers which Graham says are edible, and though they describe the plant, there are no specimens either in Dalzell's Herbarium in Herb. Kew. nor anywhere else so far as I know. The '*Kurka*' of Rheede (Hort. Mal. v. 11, t. 25), to which Graham refers the plant, has been shown by Trimen (Fl. Ceyl. v. 3, p. 374) to be *Coleus parviflorus*, a plant much cultivated in Ceylon for its edible tubers. That plant is not, however, indigenous in the Bombay Presidency nor has it to my knowledge been cultivated there. It has been found at Quilon in the southern part of the Peninsula, and Trimen (*l. c.*) thinks it may have reached Ceylon from Malaya.

Excluded Species.

PLECTRANTHUS SUBINCISUS, Benth., which Woodrow (Journ. Bomb. Nat. v. 12 (1899) p. 361) mentions as occurring at Poona, does not appear to be indigenous in the Bombay Presidency, the Poona specimens being those of an *Orthosiphon*.

8. **COLEUS,** Lour.

Herbs or undershrubs. Flowers in lax or close paniculate or racemose 6–10-flowered cymes. Calyx 2-lipped; upper lip widest, not decurrent. Corolla 2-lipped; tube exserted, decurved; throat equal or obliquely swollen; upper lip short, broad, 4-fid, recurved; lower lip much longer, entire, boat-shaped, stipitate or narrowed at the base. Stamens 4, didynamous, connate below into a sheath separate from the corolla; anther-cells usually confluent. Disk enlarged in front. Ovary 4-partite; style subequally 2-fid. Fruit of 4 orbicular or ovoid smooth dry nutlets; basal scar small.—Distrib. Asia, Tropical Africa and Australia; species 80 or more.

Upper lip of calyx ovate, acuminate, longer than the lower; bracts with a long mucro ..... 1. *C. barbatus.*
Upper lip of calyx suborbicular, shorter than the lower; bracts scarcely mucronate ..... 2. *C. spicatus.*

1. **Coleus barbatus,** *Benth. in Wall. Pl. As. Rar.* v. 2 (1831) p. 15. Perennial, 1–2 ft. high with a thick fleshy rootstock; stem cylindric, stout, ascending, slightly branched, woody at the base and, as well as the branches, villous with long hairs. Leaves 1–3 by $\frac{1}{2}$–$1\frac{1}{4}$ in., elliptic-oblong, obtuse, crenate, pubescent on both sides, base usually tapering; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers large and showy, in whorls of 6–10 which are at first rather close, afterwards distant, in long spike-like racemes 6–12 in. or more long; rhachis densely glandular-hairy; bracts large, conspicuous, imbricate before flowering, $1\frac{1}{8}$ in. long to extremity of mucro by $1\frac{1}{16}$ in. wide, broadly ovate with a slender mucro about $\frac{1}{10}$ in. long, membranous, veined, pubescent and ciliate, deciduous; pedicels short, decurved. Fruiting calyx often tinged with purple, reaching nearly $\frac{3}{8}$ in. long with white hairs outside and a ring of white hairs in the throat; upper lip ovate, acutely acuminate, entire, veined, slightly longer than the lower; lower lip of 4 subequal narrowly triangular subulately pointed teeth. Corolla pale-purple or blue, nearly $\frac{3}{4}$ in. long; tube bent nearly at a right angle, the mouth oblique; upper lip short, erect, with 4 shallow rounded lobes; lower lip stipitately narrowed into a neck at the base $\frac{1}{3}$ in. long, boat-shaped and curved upwards so that the boat-shaped portion projects horizontally beyond

the narrow neck. Filaments combined into a sheath at the base. Nutlets globose, $\frac{1}{16}$ in. in diam., smooth, nearly black. Fl. B. I. v. 4, p. 625; Grah. Cat. p. 148; Dalz. & Gibs. p. 205; Wight, Icon. t. 1432; Trim. Fl. Ceyl. v. 3, p. 373; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 846; Watt, Dict. Econ. Prod. v. 2, p. 504.—Flowers: Sept. VERN. *Main-mul*; *Garmar*.

KONKAN: *Stocks*!; Karanja hills, *Dalzell & Gibson*; Dapoli, *Nairne*. DECCAN: *Dalzell & Gibson*; Máwal, *Woodrow*; Rajwade, *Cooke*!; Purandhar, *Kanitkar*! S. M. COUNTRY: Belgaum, *Ritchie*, 549!; Gokak, *Kanitkar*! GUJARAT: *Graham*, *Woodrow*. —DISTRIB. India (subtropical Himalaya, Behar, W. Peninsula); Ceylon, Tropical Africa.

Sometimes cultivated for the roots which are pickled and eaten.

2. **Coleus spicatus,** *Benth. in Wall. Pl. As. Rar.* v. 2 (1831) p. 15. A perennial herb 6–12 in. high; stems ascending, simple or branched, quadrangular, clothed with long, soft hairs. Leaves sessile or shortly petiolate, 1–2 by $\frac{1}{2}$–1 in., obovate, fleshy, entire or crenate, pubescent on both sides, narrowed at the base. Flowers in long dense spicate woolly racemes, the whorls closely approximate at flowering time, separating a little in fruit; bracts $\frac{1}{4}$ in. long, broadly ovate or suborbicular, thinly membranous, very shortly mucronate, veined; flowering pedicels $\frac{1}{16}$ in. long. Calyx $\frac{1}{8}$ in. long, woolly outside and with a ring of hairs in the throat; upper lip shorter than the lower, orbicular, scarcely mucronate, ciliate; lower lip with 4 triangular acute ciliate teeth. Corolla exceeding $\frac{1}{2}$ in. long, slender; tube bent downwards almost at a right angle; upper lip broadly obovate, rounded, 4-lobed, the 2 middle lobes broader than the 2 lateral ones; lower lip $\frac{1}{4}$ in. long, stipitately narrowed into a neck at the base, boat-shaped beyond the neck and curved upwards so that the boat-shaped part is nearly horizontal. Filaments connate into a sheath below. Style with 2 acute rather deep lobes. Nutlets subglobose, $\frac{1}{20}$ in. in diam., smooth, shining, black when ripe. Fl. B. I. v. 4, p. 624; Wight, Icon. t. 1431; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361. *Coleus Zatarhendi*, Dalz. & Gibs. p. 206; ? Benth. Lab. p. 50.—Flowers: Nov.–Jan.

Rare. KONKAN: sandy shores, N. of Bassein, *Dalzell & Gibson*, *Woodrow*. DECCAN: Lena near Nasik, *Nairne*; Gokak on rocks, *Ritchie*, 1983!, *Woodrow*.—DISTRIB. India (W. Peninsula).

Coleus amboinicus, Lour. Fl. Cochinch. v. 2 (1790) p. 372. A plant known as *Indian Borage* from its use in flavoring "cooling cups," with thick succulent aromatic leaves and a pale purple corolla, is grown everywhere in gardens, but is nowhere indigenous in the Bombay Presidency. *Coleus aromaticus*, Benth. in Wall. Pl. As. Rar. v. 2 (1831) p. 15; Grah. Cat. p. 148; Dalz. & Gibs. Suppl. p. 66; Hook. f. Fl. B. I. v. 4, p. 625; Trim. Fl. Ceyl. v. 3, p. 374; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 846; Watt, Dict. Econ. Prod. v. 2, p. 503.—VERN. *Pánácha-onva*; *Patharchur*.

Coleus Blumei, Benth. Lab. Gen. & Sp. (1833) p. 56. Of this species, a native of Java, most of the almost innumerable forms of *Coleus* grown for decorative purposes are varieties. The self-colored and variegated leaves of some of these present magnificent variations of color, and the

plants, which are easily grown from cuttings, are much used as ornamental pot-plants throughout India. A very fine variety with velvety crimson leaves is *C. Verschaffelttii*, perhaps a distinct species. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361.

9. **ANISOCHILUS,** Wall.

Herbs or undershrubs. Flowers small, in dense oblong 4-angled or cylindric spikes; bracts caducous. Calyx suberect, inflated below the middle, 2-lipped or 5-toothed (rarely 1-lipped); upper lip entire and deflexed, or short and minutely 3-lobed; lower lip short, truncate, obscurely toothed or 0. Corolla 2-lipped; tube slender below, inflated at the throat; upper lip short, entire or 3-4-fid; lower elongate, concave. Stamens 4, didynamous, declinate; filaments free. Disk lobed. Ovary 4-partite; style 2-fid at the apex. Fruit of 4 ovoid or suborbicular smooth dry nutlets; basal scar small.—DISTRIB. Species 16, chiefly East Indian.

Upper lip of fruiting calyx concealing the mouth of the calyx; leaves opposite, petiolate ..... 1. *A. carnosus.*
Upper lip of fruiting calyx not concealing the mouth of the calyx; leaves usually verticillate, sessile..... 2. *A. verticillatus.*

1. **Anisochilus carnosus,** *Wall. Pl. As. Rar.* v. 2 (1831) p. 18. Annual, erect, 1–2 ft. high; stem stout, bluntly quadrangular, glabrous or finely pubescent, often tinged with red. Leaves 1–2½ by ½–1⅝ in., broadly ovate, obtuse, crenate, somewhat fleshy, glabrous or slightly pubescent above, usually pubescent beneath, base subcordate or rounded; petioles ½–1¼ in. long. Flowers sessile, in dense ultimately cylindric spikes ½–1½ in. long, elongating in fruit; peduncles long, slender; bracts ⅛ in. long, broadly ovate, acuminate, pubescent and glandular, ciliate, veined, caducous. Calyx pubescent, ⅕ in. long in flower, sometimes ⅓ in. long in fruit; upper lip in fruit ovate-lanceolate, acute, ciliolate, decurved over the lower lip and closing the calyx-mouth; lower lip truncate, the tip very membranous, ciliate, turned back and appressed on the tube by the pressure of the upper lip. Corolla pale-purple, ⅜ in. long, pubescent outside; tube narrow below, inflated above; upper lip short, erect, with very shallow rounded lobes; lower lip ⅙ in. long, concave. Nutlets 1/20 in. in diam., suborbicular, compressed, smooth, polished, brown. Fl. B. I. v. 4, p. 627; Grah. Cat. p. 148; Dalz. & Gibs. p. 206; Wight, Ill. t. 176 b, fig. 1; Trim. Fl. Ceyl. v. 3, p. 376; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 847; Watt, Dict. Econ. Prod. v. 1, p. 254. —Flowers: Sept.–Oct. VERN. *Charonvá*; *Kápurli*; *Pánjiri.*

DECCAN: Máwal, *Woodrow*; Junnar, *Kanitkar*! S. M. COUNTRY: Belgaum, *Cooke*!, *Ritchie*, 1984!—DISTRIB. India (W. Himalaya, Bengal, Central India, W. Peninsula); Ceylon, Ava.

VAR. *eriocephalus.* More slender; heads more numerous; calyx villous and glandular. *Anisochilus eriocephalus* (sp.), Benth. in DC. Prodr. v. 12, p. 81; Hook. f. Fl. B. I. v. 4, p. 627; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361. *A. decussatus*, Dalz. in Dalz. & Gibs. Bo. Fl. p. 206.

KONKAN: Ghâts, *Woodrow*; on the highest Ghâts opposite Bombay in rocky places, *Dalzell & Gibson.* DECCAN: Lena near Nasik, *Nairne.*

2. **Anisochilus verticillatus,** *Hook. f. Fl. B. I.* v. 4 (1885) p. 629. An erect herb 1½–3 ft. high; stem simple, silky-villous, deeply grooved, stout. Leaves usually in close whorls of 4–6 (rarely in opposite pairs), sessile, 1½–3½ by ¼–⅝ in., smaller upwards, oblong-lanceolate, subacute, entire or crenulate, densely silky-villous on both sides, base narrowed. Flowers sessile in dense pedunculate cylindric spikes 3–9 in. long; bracts ⅜ in. long, lanceolate, very acute, pubescent, conspicuous on the young spikes. Fruiting calyx ⅕ in. long, shortly cylindric, densely pubescent and glandular; tube reflexed about the middle; upper lip short, truncate or sometimes shortly and bluntly acuminate, not concealing the lower lip; lower lip truncate, obscurely toothed. Corolla exceeding ⅜ in. long, pale-blue, pubescent and glandular; tube deflexed, ¼ in. long; upper lip broadly ovate or suborbicular, ⅛ in. long, with 4 shallow obtuse lobes; lower lip longer than the upper, concave. Nutlets $\frac{1}{20}$ in. in diam., suborbicular, compressed, smooth, polished, brown.—Flowers: Oct.

Dalzell without locality in Herb. Kew.! DECCAN: Mahableshwar, *Cooke*! S. M. COUNTRY: Cheeta hill, Belgaum, *Ritchie*, 546!; Párva Ghát, *Ritchie*, 1985!—DISTRIB. India (W. Peninsula).

UNKNOWN SPECIES.

ANISOCHILUS ADENANTHUS, Dalz. in Dalz. & Gibs. Bo. Fl. (1861) p. 206. Spikes dense, pyramidal; floral leaves lanceolate, acuminate, pubescent, 3-nerved, 3 lines long; calyx minute, oblique, truncate, scarcely toothed, tomentose on the outside; corolla glandular-dotted, 5 lines long, tomentose outside, lower lip long, entire, boat-shaped, upper 3–4-lobed, rounded, obtuse, short.

The above is the description in Dalzell & Gibson's Bombay Flora (*l. c.*). There are no specimens in Dalzell's herbarium in Herb. Kew., and as Dalzell states that part of his specimens had been lost, there does not seem any likelihood of finding out what plant is meant. The habitat is given near Dharwar (S. M. Country). It may perhaps be *Anisochilus verticillatus*, Hook. f., which has been found in the S. M. Country.

10. LAVANDULA, Linn.

Herbs or shrubs. Leaves incised or entire. Flowers in 2–10-flowered whorls collected in simple or branched spikes; bracts persistent. Calyx erect, ovoid-tubular, shortly equally 5-toothed, 13–15-nerved. Corolla blue or purple (rarely white), oblique, 2-lipped; upper lip 2-fid; lower lip 3-partite with spreading lobes. Stamens 4, didynamous, declinate, included; filaments free; anther-cells confluent. Disk equally 4-lobed, the nutlets dorsally attached to the lobes leaving a large areole on separation. Ovary 4-partite; style shortly 2-fid, the lobes flattened. Fruit of 4 dry smooth nutlets; basal scar slightly oblique.—DISTRIB. Species about 30, chiefly Mediterranean, 2 species in India.

Stems villous; leaves petiolate, pinnatisect, the lobes broad, oblong; bracts not awned ..... 1. *L. Gibsoni.*
Stems finely pubescent; leaves subsessile, pinnatipartite, the lobes narrow, linear; bracts with a long capillary awn ..... 2. *L. Burmanni.*

1. **Lavandula Gibsoni,** *Grah. Cat. Bo. Pl.* (1839) p. 149. An erect villous herb 2–3 ft. high; stem quadrangular, leafy, usually simple, densely villous. Leaves 1–6 in. long, smaller upwards, deeply pinnatisect, the lobes oblong, usually obtuse, pinnatifid or toothed, the

lower leaves with long petioles, the upper sometimes nearly sessile, all green and softly villous on both sides. Flowers in dense simple or slightly branched villous spikes 1–4 in. long; bracts $\frac{1}{3}$ in. long, ovate or obovate-oblong, acuminate, strongly parallel-nerved, pubescent, ciliate, persistent, each with a single flower in its axil. Fruiting calyx villous, tubular, rather more than $\frac{1}{4}$ in. long, 15-ribbed; teeth equal, lanceolate, acute, ciliate. Corolla $\frac{1}{2}$ in. long; tube $\frac{1}{3}$ in. long, very slender below, slightly dilated above; upper lip oblong with 2 short obtuse lobes; lower lip 3-lobed, the middle lobe much longer and broader than the oblong obtuse lateral ones. Nutlets $\frac{1}{12}$ by $\frac{1}{16}$ in., ellipsoid-oblong, smooth, mucilaginous when wetted, black when ripe, with a large white oblong areole on the dorsal side. Fl. B. I. v. 4, p. 631; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361. *Lavandula Perrottetii*, Benth. in DC. Prodr. v. 12 (1848) p. 147; Dalz. & Gibs. p. 206. *L. Lawii*, Wight, Icon. t. 1439.—Flowers: Nov.–Apr. VERN. *Nivale.*

KONKAN: *Stocks*! DECCAN: Ghâts on the road from Poona to Mahableshwar, *H. M. Birdwood*; Fort of Pandughar, *Graham*; hills near Poona, *Woodrow*!; Panchgani, *Cooke*!; Kartriz Ghât, *Kanitkar*!; hills at Sattara, *Wight*, 149!, *Dalzell & Gibson.*—DISTRIB. India (W. Peninsula).

2. **Lavandula Burmanni,** *Benth. Lab. Gen. & Sp.* (1833) p. 151. A slender erect herb; stems simple or branched, leafy, quadrangular, finely pubescent. Leaves sessile or nearly so, 1½–4 in. long and as broad as long, pinnatipartite or very deeply pinnatisect, the lobes linear, entire, cut or toothed, obtuse or subacute, $\frac{1}{16}$–$\frac{1}{8}$ in. broad (rarely broader), glabrous or pubescent above, pale and pubescent beneath. Flowers in spikes which are simple or with few or many branches, sometimes umbellately arranged; bracts finely pubescent, persistent, $\frac{1}{4}$–$\frac{1}{3}$ in. long with a short, broadly-ovate, strongly nerved base, produced into a long capillary awn at the apex. Fruiting calyx $\frac{1}{5}$ in. long, tubular, slightly curved, clothed with fine hoary pubescence; teeth equal, lanceolate, acute, with penicillate tips. Corolla blue or white, pubescent outside, exceeding $\frac{1}{2}$ in. long; tube $\frac{1}{3}$ in. long, the lower half very slender, the upper half slightly dilated; upper lip $\frac{1}{8}$ in. long, oblong, with 2 short rounded lobes; lower lip 5-partite, the middle lobe oblong, rounded, more than twice as long as the ovate obtuse lateral lobes. Nutlets $\frac{1}{12}$ by $\frac{1}{20}$ in., oblong-ellipsoid, smooth, very mucilaginous when wetted, black when ripe, with a large white oblong areole on the dorsal side. Fl. B. I. v. 4, p. 631; Grah. Cat. p. 149; Dalz. & Gibs. p. 207; Wight, Icon. t. 1438; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 848.—Flowers: Oct.–Nov. VERN. *Ghodeghui*; *Gorea.*

KONKAN: *Stocks*!; Salsette, *Law*! DECCAN: common, *Graham*; Deccan hills, *Cooke*!, *Woodrow*!; Khandesh, *Kanitkar*!—DISTRIB. India (Chota Nagpur, Jubbulpore, W. Peninsula).

Lavandula Stœchas, Linn. Sp. Pl. (1753) p. 573. A shrub 2–3 ft. high with oblong-linear entire glaucous leaves with revolute margins, and dark-purple flowers in dense spikes, a native of the Mediterranean regions, has been grown in gardens in Belgaum and Dharwar, where it is said to have been introduced from the Cape of Good Hope.

Though not grown for economic purposes in the Bombay Presidency,

the dried plants and flowers are employed in native medicine and are largely imported into Bombay from the Persian Gulf. Grah. Cat. p. 149; Dalz. & Gibs. Suppl. p. 66; Watt, Dict. Econ. Prod. v. 4, p. 595.

Lavandula vera, DC., the *True Lavender*, so well known in English gardens, does not flourish in Bombay, where it sometimes drags out a sickly existence as a pot-plant about bungalows. Dalz. & Gibs. Suppl. p. 66; Watt, Dict. Econ. Prod. v. 4, p. 596.

11. **POGOSTEMON,** Desf.

Herbs or undershrubs. Leaves opposite (rarely ternate). Flowers small, in simple or panicled spikes or contracted racemes formed of many dense-flowered subcapitate cymes (whorls). Calyx subequally 5-toothed. Corolla 2-lipped, 4-lobed; upper lip 3-lobed, the middle lobe often longer and narrower than the lateral ones; lower lip flat, spreading, narrow, entire. Stamens 4, exserted, subequal, straight or declinate; filaments usually bearded; anther-cells confluent. Ovary 4-partite; style shortly 2-fid, the lobes equal, subulate. Fruit of 4 smooth ovoid or ellipsoid dry nutlets, one of the faces often angled.—DISTRIB. India and E. Asia; species about 30.

Opposite pairs of leaves very unequal; bracts obliquely ovate or suborbicular, imbricate	1. *P. paniculatus.*
Opposite pairs of leaves not very unequal.	
Stems glabrous or nearly so, smooth and shining; leaves with an odor of black currants	2. *P. parviflorus.*
Stems hoary-pubescent or villous.	
Calyx-teeth short	3. *P. plectranthoides.*
Calyx-teeth nearly as long as the tube	4. *P. purpurascens.*

1. **Pogostemon paniculatus,** *Benth. in Wall. Pl. As. Rar.* v. 1 (1830) p. 30. An erect branched herb 2–4 ft. high; stems slender, hairy. Leaves usually in unequal opposite pairs, one of them smaller than the other, thinly membranous, 1–5 by ½–3 in., ovate, irregularly inciso-serrate, hairy with appressed hairs on both sides, reticulately veined, base cuneate; petioles ⅛–¾ in. long. Flowers in axillary and terminal interrupted slender spikes 4–8 in. long, forming a paniculate inflorescence; whorls globose, distant in the lower part of the spike, becoming closer near the top, secund; bracts ¼ by ⅙ in., thin, broadly obliquely ovate, or suborbicular, subacute, membranous, arranged in an imbricate series, veined, pubescent and ciliate. Calyx ⅕ in. long, narrowly tubular, pubescent; teeth lanceolate, acute, equal. Corolla ⅙–⅕ in. long; tube very slender. Filaments bearded. Nutlets $\frac{1}{25}$ in. long, broadly ovoid, smooth. Fl. B. I. v. 4, p. 631; Grah. Cat. p. 149; Dalz. & Gibs. p. 207; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361. —Flowers: Dec.

Rare. KONKAN: *Stocks*!; S. Konkan, *Graham, Dalzell & Gibson.* KANARA: Halyál (N. Kanara), *Woodrow.*—DISTRIB. India (W. Peninsula, Birma).

2. **Pogostemon parviflorus,** *Benth. in Wall. Pl. As. Rar.* v. 1 (1830) p. 31. Suffruticose, 4–6 ft. high; stem and branches obtusely quadrangular, usually purple, smooth and shining or sometimes slightly pubescent. Leaves with a strong odor of black currants when bruised,

3–7 by 1½–3½ in., broadly ovate, acute or acuminate, coarsely and irregularly doubly-toothed, glabrous or slightly pubescent, base cuneate; petioles ⅝–2 in. long. Flowers in dense pubescent spikes forming pyramidal lax panicles; whorls many-flowered, usually close; bracts pubescent and ciliate, the outer ¼ in. long, foliaceous, ovate, acute, the inner membranous, linear-lanceolate, often subfalcate, about equalling the calyx. Calyx ⅛ in. long, glandular and pubescent; tube pentagonal; teeth $\frac{1}{20}$ in. long, lanceolate. Corolla-tube ⅛ in. long; upper lip white, shot with purple, 3-lobed, the middle lobe oblong, rounded, longer and narrower than the 2 rounded lateral ones; lower lip entire, white. Stamens exserted; filaments purple except just below the anthers, where they are white, bearded with purple hairs. Style purple, the tips of the apical lobes usually white. Nutlets $\frac{1}{30}$ in. long, ellipsoid, the inner face angular, the dorsal face rounded, smooth and shining, black. Fl. B. I. v. 4, p. 632; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 849; Watt, Dict. Econ. Prod. v. 6, part 1, p. 306. *Pogostemon frutescens*, Grah. Cat. p. 149. *P. purpuricaulis*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 336; Dalz. & Gibs. p. 207.—Flowers: Dec.–Feb. VERN. *Pángli.*

KONKAN: hilly parts pretty common, *Dalzell & Gibson.* DECCAN: Igatpuri, *Graham*; Khandala, *Cooke*!; Mahableshwar, abundant, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 543!; Rámghát, *Ritchie*, 543! KANARA: Sulgeri, *Woodrow.*—DISTRIB. More or less throughout India.

In the Ratnagiri district the root taken internally and applied as a paste to the wound has been long in use as a remedy for the bite of the poisonous snake *Phursa* (*Echis carinata*), and apparently with marked success. A full description of cases treated by several surgeons at Ratnagiri is given by Dr. Dymock in the Journal of the Bombay Natural History Society, vol. 6 (1891) pp. 450–457.

3. **Pogostemon plectranthoides,** *Desf. in Mém. Mus. Par.* v. 2 (1815) p. 155, t. 6 (*plectrantoides*). A large branched erect bush; branches round or subquadrangular, the young ones hoary-pubescent, often dark-purple. Leaves 2–5 by 1¼–2¾ in., ovate, acute, doubly serrate, pubescent or nearly glabrous, base rounded or cuneate; petioles ½–1¼ in. long. Flowers in dense hoary-pubescent or villous terminal and axillary stout spikes forming a paniculate inflorescence; whorls many-flowered, close; bracts reaching ⅓ in. long, foliaceous, broadly ovate, acute, pubescent and ciliate, enclosing a fascicle of sessile flowers intermingled with membranous bracteoles of various sizes, mostly linear-lanceolate, often tinged with purple. Calyx $\frac{1}{6}$–$\frac{1}{5}$ in. long, slightly obconic, pubescent and glandular, often tinged with purple at the apex; teeth lanceolate, acute, ciliate. Corolla ⅓ in. long, pink or white; tube slender, ⅕ in. long, cylindric; upper lip $\frac{1}{6}$ in. long, 3-lobed, the middle lobe narrow, linear, obtuse, longer than the 2 short broad obtuse lateral lobes; lower lip narrow, $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate-oblong, obtuse, entire. Stamens much exserted; filaments bearded. Nutlets $\frac{1}{30}$ in. long, broadly ellipsoid, the inner face angular, the dorsal face rounded, smooth, shining, brown-black when ripe. Fl. B. I. v. 4, p. 632; Dalz. & Gibs. p. 207; Bot. Mag. t. 3238; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 849.—Flowers: Jan.–Feb.

Dalzell without locality in Herb. Kew. KONKAN: *Stocks*!, *Law*! DECCAN: Poona, *Ranade*!, *Woodrow.* KANARA: Sulgeri (N. Kanara), *Talbot*, 274! GUJARAT: Chikli (Surat Collectorate), *Dalzell & Gibson.*—DISTRIB. India (W. Himalaya, Lower Bengal, Behar, W. Peninsula).

4. **Pogostemon purpurascens,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 337. An erect branched herb; stems and branches quadrangular, furrowed, softly hairy with spreading hairs. Leaves membranous, often tinged with purple, 2½–7 by 1¼–3½ in., ovate, acute, more or less deeply cut, often doubly serrate, softly hairy on both sides, base cuneate; petioles ½–2 in. long. Flowers in long-pedunculate villous spikes 3–8 in. long; whorls many-flowered, globose, the upper whorls approximate, the lower usually separate; bracts ⅕ in. long, oblong-lanceolate, acute, sometimes slightly falcate, pubescent, penicillate at the tip, ciliate, veined. Calyx ⅕ in. long, pubescent; tube pentagonal; teeth nearly equalling the tube, lanceolate, acute, 3-nerved, ciliate and with penicillate tips. Corolla ¼ in. long; tube ⅙–⅕ in. long, white; upper lip purple with white margin, 3-lobed, the middle lobe oblong, obtuse, longer and narrower than the 2 obtuse lateral ones; lower lip, white, deltoid-ovate, acute. Stamens bearded. Nutlets $\frac{1}{30}$ in. long, ovoid, compressed, the inner face angular, the dorsal face rounded, smooth, polished, black when ripe. Fl. B. I. v. 4, p. 632; Dalz. & Gibs. p. 207; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361.—Flowers: Oct.–Jan.

KONKAN: *Stocks!*; *Ritchie*, 541!; shady woods in the Konkan, *Dalzell!*; Matheran, *Cooke!*; Marmagão, *Cooke!*; Viziadrug Fort, *Kanitkar!* DECCAN: Khandala, *Woodrow!* KANARA: *Law!*; Kála naddi, *Ritchie*, 541!—DISTRIB. India (W. Peninsula).

Pogostemon Heyneanus, Benth. in Wall. Pl. As. Rar. v. 1 (1830) p. 31. The *Patchouly Plant*, grown in gardens and sometimes found as an escape. Its peculiar odor distinguishes it from *P. parviflorus*, which it much resembles. The dried leaves strewn among woollen cloths are said to keep off insects. Grah. Cat. p. 149; Dalz. & Gibs. p. 207; Wight, Icon. t. 1440; Jackson, Index Kewen. v. 3 (1895) p. 583; Trim. Fl. Ceyl. v. 3, p. 378. *Pogostemon Patchouly*, Pellet. in Mém. Soc. Sc. Orléans, v. 5 (1845) p. 277, t. 7; Hook. f. Fl. B. I. v. 4, p. 633 (*Patchouli*); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Dalz. & Gibs. Suppl. p. 66 (*Patchowli*).—VERN. *Pách.*

EXCLUDED SPECIES.

POGOSTEMON MOLLIS, Benth. Lab. Gen. & Sp. (1833) p. 155. A low softly tomentoso-villous plant branched from the base; stem ascending; leaves orbicular or oblong, crenate; flowers in cylindric spikes, the upper whorls approximate, the lower distant; bracts linear-subulate; filaments bearded.

This appears to be a Nilghiri plant growing at high elevations (7000–8000 ft.). A specimen of Dalzell's in Herb. Kew. has no locality marked on the sheet, while the specimen marked "Konkan, Stocks," was not so marked by Stocks, but has merely a printed label on it. The plant has not been found in the Bombay Presidency so far as I know. Fl. B. I. v. 4, p. 635. *Pogostemon rotundatus*, Wight, Icon. t. 1441 (*not* of Benth.).

12. **DYSOPHYLLA,** Blume.

Herbs or undershrubs. Leaves opposite or whorled. Flowers minute, in very dense long spikes of many whorled cymes. Calyx minute, ovoid, equally 5-toothed; throat naked within. Corolla small, equally 4-fid;

tube included or exserted; upper lobe entire or 2-fid; lower lobes somewhat spreading. Stamens 4, exserted, subequal or slightly unequal, straight or subdeclinate; filaments bearded; anther-cells confluent. Disk equal, subentire. Ovary 4-partite; style 2-fid, the lobes subulate, equal. Fruit of 4 (rarely 1) ovoid or oblong, smooth or rough dry nutlets: basal scar small.—DISTRIB. Tropical Asia and Australia; species about 12.

Leaves opposite.	
Bracts $\frac{1}{20}$ in. long, linear-oblong; corolla-tube included; calyx-teeth erect, shorter than the tube	1. *D. myosuroides.*
Bracts $\frac{1}{8}$–$\frac{1}{4}$ in. long, lanceolate; corolla-tube exserted.	
Stem and leaves densely clothed with long coarse spreading hairs; leaves with rounded base; calyx-teeth minute, inflexed in fruit	2. *D. auricularia.*
Stem and leaves sparsely appressedly hairy; base of leaves very acute; calyx-teeth nearly as long as the tube, erect in fruit	3. *D. salicifolia.*
Leaves whorled.	
Calyx not grooved nor ridged; nutlets 4.	
Leaves in whorls of 4	4. *D. quadrifolia.*
Leaves in whorls of 5 or more	5. *D. stellata.*
Calyx strongly 5-ribbed; nutlet solitary	6. *D. Stocksii.*

1. **Dysophylla myosuroides,** *Benth. in Wall. Pl. As. Rar.* v. 1 (1830) p. 30. A much-branched perennial herb 8–15 in. high with a woody rootstock; stem and branches nearly round, woody below, the young ones silky-villous or tomentose. Leaves $\frac{7}{8}$–$1\frac{1}{2}$ by $\frac{1}{8}$–$\frac{3}{8}$ in., nearly sessile, thick, elliptic-oblong, subacute, silky-villous, entire or denticulate, strongly nerved, the nerves conspicuous on both sides. Flowers in long simple or branched continuous dense, shortly-pedunculate tomentose cylindric spikes 1–4 by $\frac{1}{6}$ in.; bracts $\frac{1}{20}$ in. long, linear-oblong, ciliate. Calyx $\frac{1}{20}$–$\frac{1}{16}$ in. long, densely silky; teeth equal, triangular, shorter than the tube, erect in fruit. Corolla red, $\frac{1}{16}$ in. long; tube included; lobes 4, subequal, oblong, rounded. Style-arms subulate. Nutlets ellipsoid, compressed, granulate. Fl. B. I. v. 4, p. 638; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361. *Dysophylla myosuroides*, Dalz. & Gibs. p. 208.—Flowers: Jan.

Stocks!, *Dalzell!*, both without locality in Herb. Kew. DECCAN: Mahableshwar, *Dalzell & Gibson*, *Woodrow.*—DISTRIB. India (W. Peninsula).

2. **Dysophylla auricularia,** *Blume, Bijdr.* (1826) p. 826. A coarse annual 1–2 ft. high; stems erect, much-branched, quadrangular, densely clothed with long coarse spreading hairs. Leaves opposite, shortly petiolate, 1–$2\frac{1}{2}$ by $\frac{1}{2}$–1 in., elliptic-oblong, subacute, serrate, hairy on both sides, base rounded. Flowers shortly pedicellate, in spicate racemes 2–4 by $\frac{1}{6}$–$\frac{1}{3}$ in.; bracts $\frac{1}{8}$ in. long, lanceolate, acute, usually shortly stalked, densely ciliate with long hairs. Calyx scarcely $\frac{1}{20}$ in. long; teeth minute, triangular, acute, inflexed in fruit. Corolla less than $\frac{1}{8}$ in. long, pale-lilac; tube exserted; lobes ovate, acute, hairy at the back. Nutlets about $\frac{1}{40}$ in. long, broadly ellipsoid, smooth, the inner face slightly angular, the dorsal face rounded. Fl. B. I. v. 4, p. 638; Grah. Cat. p. 150?; Wight, Icon. t. 1445; Trim. Fl. Ceyl. v. 3, p. 380; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 849.

KONKAN: *Stocks*!

There is but one sheet in Herb. Kew. marked as above with a printed ticket; otherwise I have seen no specimens from Bombay. Woodrow in his list gives "Belgaum, *Ritchie*," but I have seen no specimens from Belgaum. Graham gives "hills about Goa," but it is doubtful if Graham's plant is *D. auricularia*; it is more probably *D. salicifolia* which is common in watercourses at Mahableshwar which he also assigns as a habitat of his *D. auricularia*.—DISTRIB. India (Sikkim, Assam, E. Bengal, W. Peninsula); Ceylon, China, Borneo, Philippines.

3. **Dysophylla salicifolia,** *Dalz. MS. ex Hook. f. Fl. B. I.* v. 4 (1885) p. 638. Erect, much-branched, 1–2 ft. high; stem and branches round or subquadrangular, reddish, the younger sparsely appressedly hairy. Leaves 1–3½ by $\frac{1}{6}$–$\frac{1}{2}$ in., lanceolate, acute, entire or distantly serrate, appressedly hairy when young, gland-dotted, base very acute, running down into the petiole which is often obscure. Flowers in dense shortly pedunculate villous spikes 1–3 in. long; bracts $\frac{1}{8}$–$\frac{1}{5}$ in. long, narrowly lanceolate, acute, hairy. Calyx $\frac{1}{12}$–$\frac{1}{10}$ in. long, hairy; teeth triangular, equal, nearly as long as the tube. Corolla scarcely $\frac{1}{8}$ in. long, purple; tube slightly exserted; lobes subequal, oblong, obtuse. Nutlets $\frac{1}{30}$ in. long, ellipsoid, smooth, the inner face slightly angular, the dorsal face rounded. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361.—Flowers: Jan.–Apr.

DECCAN: abundant at Mahableshwar in watercourses, *Cooke!*, *Law!*, *Woodrow*. S. M. COUNTRY: Hingregi watercourse, Belgaum, *Ritchie*, 1990!—DISTRIB. India (W. Peninsula).

4. **Dysophylla quadrifolia,** *Benth. in Wall. Pl. As. Rar.* v. 1 (1830) p. 30. A stout erect undershrub with an odor of camphor, 2–4 ft. high; rootstock woody; stems not much branched, round, pubescent or tomentose. Leaves 4 in a whorl, 1–4 by $\frac{1}{8}$–$\frac{1}{3}$ in., shortly petiolate, linear-oblong or linear-lanceolate, acute or subobtuse, usually serrate, softly pubescent on both sides, base narrowed. Flowers in dense tomentose or pubescent spikes 3–6 by $\frac{1}{6}$–$\frac{1}{3}$ in., sometimes interrupted near the base; bracts $\frac{1}{12}$ in. long, linear-spathulate, hairy. Calyx obconic, $\frac{1}{16}$ in. long, pubescent; teeth about $\frac{1}{2}$ as long as the tube, triangular, ciliate. Corolla $\frac{1}{8}$ in. long, rose-colored; tube $\frac{1}{10}$ in. long; lobes oblong, obtuse. Nutlets $\frac{1}{40}$ in. long, broadly ellipsoid or subglobose, microscopically papilloso-rugulose, black. Fl. B. I. v. 4, p. 639; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 850. *Dysophylla rupestris,* Dalz. in Kew Journ. Bot. v. 3 (1851) p. 120; Dalz. & Gibs. p. 208.

Stocks without locality in Herb. Kew.! KONKAN: Malwán on rocks, *Dalzell!*; near Vingorla, *Dalzell & Gibson*.—DISTRIB. India (Assam, Birma, Chittagong, W. Peninsula).

5. **Dysophylla stellata,** *Benth. in Wall. Pl. As. Rar.* v. 1 (1830) p. 30. A low herb; stems numerous, erect, 3–8 in. long, simple or branched, leafy and with short internodes from a creeping rootstock. Leaves many in a whorl, sessile, $\frac{1}{6}$–$\frac{3}{8}$ by $\frac{1}{30}$–$\frac{1}{16}$ in., linear, subacute, more or less pubescent, entire, with revolute margins and a strong midnerve, base obtuse. Flowers sessile, in dense pubescent or tomentose spikes 1–2½ by $\frac{1}{6}$ in.; bracts persistent after the fruit falls, $\frac{1}{10}$–$\frac{1}{8}$ in. long, consisting of a lanceolate acute blade $\frac{1}{20}$–$\frac{1}{16}$ in. long, bent at an angle where it joins the stalk, ciliate and terminated at the apex by 2 or 3 transparent bristles, the blade on a filiform pubescent stalk about as

long as the blade. Calyx $\frac{1}{20}$–$\frac{1}{16}$ in. long, subhemispheric or campanulate, pubescent; teeth triangular, erect or slightly inflexed, more than $\frac{1}{2}$ as long as the tube. Corolla $\frac{1}{12}$ in. long; tube $\frac{1}{20}$ in. long; lobes ovate-oblong, obtuse, hairy outside. Stamens much exserted, bearded with purple hairs. Nutlets ellipsoid, $\frac{1}{30}$ in. long and $\frac{1}{2}$ as broad as long, smooth, yellowish-brown. Fl. B. I. v. 4, p. 640; Grah. Cat. p. 150; Dalz. & Gibs. p. 209; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361.—Flowers: Nov.-Jan.

KONKAN: *Law*! S. M. COUNTRY: Belgaum in great abundance in rice-fields, *Law* ex *Graham*, *Ritchie*, 1989! KANARA: *Thomson*!—DISTRIB. India (W. Peninsula).

VAR. 1. *tomentosa*. Stout, erect, 10–12 in. high, branched, pubescent with long hairs; internodes very short; bracts reaching $\frac{1}{8}$ in. long exactly as in *D. stellata*; calyx subcampanulate.

Dalzell describes the bracts as conform with the leaves which is incorrect. *Dysophylla tomentosa* (sp.), Dalz. in Kew Journ. Bot. v. 2 (1850) p. 337; Dalz. & Gibs. p. 208; Hook. f. Fl. B. I. v. 4, p. 641; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361.—Flowers: Dec.

KONKAN: Malwán in ricefields between Deoghar and Viziadrug, *Dalzell*!

VAR. 2. *gracilis*. A tall form; stem 1–3 ft. high, sometimes as thick as a swan's quill; leaves $\frac{1}{4}$–$\frac{1}{2}$ in. long, 5–20 in a whorl, entire; spikes 1–2 by $\frac{1}{6}$ in.; bracts exactly as in *D. stellata*, the lanceolate blade $\frac{1}{20}$ in. long; calyx $\frac{1}{16}$ in. long, hemispheric, the teeth erect or slightly inflexed; corolla $\frac{1}{10}$ in. long. The bracts sometimes appear filiform in consequence of the blade having broken off when the filiform stalks only are left. Dalzell describes the bracts as linear-acute, which is not the case in all specimens of his which I have examined. *Dysophylla gracilis* (sp.), Dalz. in Kew Journ. Bot. v. 2 (1850) p. 337; Dalz. & Gibs. p. 208; Hook. f. Fl. B. I. v. 4, p. 641; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361. *D. erecta* (sp.), Dalz. in Kew Journ. Bot. v. 2 (1850) p. 337; Dalz. & Gibs. p. 208; Hook. f. Fl. B. I. v. 4, p. 641; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361.—Flowers: Nov.-Jan.

DECCAN: Phonda Ghát, *Dalzell*!; Gogve, west of Kolhapur, *Kanitkar*!; Mahableshwar, *Cooke*!; hills near Junnar, *Bhiva*!

6. **Dysophylla Stocksii,** *Hook. f. Fl. B. I.* v. 4 (1885) p. 642. Stout, erect, nearly glabrous; stem as thick as a goose-quill, decumbent below; branches suberect. Leaves 9–20 in a whorl, $\frac{1}{3}$–$\frac{2}{3}$ by $\frac{1}{12}$–$\frac{1}{10}$ in., narrowly linear, obtuse, with recurved margins, glabrous or nearly so. Flowers in dense slender spikes 2–3 by $\frac{1}{6}$–$\frac{1}{4}$ in.; rhachis hairy; bracts with a clavate head on a filiform stalk, longer than the calyx. Calyx in flower less than $\frac{1}{20}$ in. long with triangular obtuse lobes nearly equalling the tube, in fruit $\frac{1}{16}$ in. long completely enclosing the solitary nutlet, strongly 5-ribbed, pubescent. Corolla $\frac{1}{12}$ in. long; lobes obtuse, nearly glabrous on the back. Nutlets $\frac{1}{16}$ by $\frac{1}{40}$ in., narrowly oblong-ellipsoid, smooth, shining, brown. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361.

KONKAN: *Stocks*!

13. COLEBROOKEA, Sm.

A densely hoary or woolly shrub. Leaves opposite or ternate, petiolate, rugose, oblong-lanceolate, crenulate. Flowers small; whorls

dense-flowered in paniculate spikes; bracteoles connate. Calyx-tube very short; teeth long, subulate, ultimately elongate, capillary and plumose. Corolla small; tube very short; lobes 4, subequal. Stamens 4, very short, included, equal, distant; anthers orbicular, the cells confluent. Disk uniform. Ovary 4-partite; style 2-fid, the lobes subulate. Fruit of 1 or 4 obovoid dry nutlets with hairy tips; basal scar small.—DISTRIB. More or less throughout India on low hills; species 1.

1. **Colebrookea oppositifolia,** *Sm. Exot. Bot.* v. 2 (1805–07) p. 111, t. 115. A functionally diœcious much-branched shrub 4–10 ft. high; trunk stout, light-colored; branches pale, subquadrangular, usually verticillate in threes, grooved; young shoots downy. Leaves light-green, crowded towards the ends of the branches, opposite or verticillate in threes, 4–6 by $\frac{7}{8}$–$1\frac{3}{4}$ in., oblong-lanceolate, acute, crenulate or serrulate, softly pubescent on both sides, base acute; petioles $\frac{3}{8}$–1 in. long. Flowers numerous, in paniculate often ternately arranged spikes 2–4 in. long by $\frac{1}{4}$ in. in diam. in flower, reaching $\frac{1}{2}$ in. in diam. or more in fruit; bracts $\frac{1}{16}$ in. long, solitary, linear, pubescent; bracteoles several, $\frac{1}{12}$ in. long, connate at the base into a whorl. Calyx in flower $\frac{1}{10}$–$\frac{1}{8}$ in. long, 5-partite almost to the base; teeth subulate, plumose with white hairs, elongating to nearly $\frac{1}{4}$ in. in fruit when the spikes appear, as aptly described by Graham, like (*Indian*) squirrels' tails. Corolla $\frac{1}{12}$ in. long, white; upper lobe emarginate. Nutlets $\frac{1}{30}$ in. long, oblong-obovoid, pubescent, usually solitary, hairy at the tip. Fl. B. I. v. 4, p. 642; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 851; Watt, Dict. Econ. Prod. v. 2, p. 503. *Colebrookea ternifolia,* Roxb. Cor. Pl. v. 3 (1819) p. 40, t. 245; Grah. Cat. p. 150; Dalz. & Gibs. p. 209.—Flowers: Dec.–Apr. VERN. *Bhâman.*

Very common on the Ghâts. KONKAN: *Stocks!, Law!*; Konkan hills, *Woodrow!* DECCAN: Parvati hill near Poona, *Devdhar!*; Khandala, *Graham, Cooke!*; Karkala, *Kanitkar!*; hills about Pâr, *Graham*; Mahableshwar, *Cooke!* S. M. COUNTRY: Castlerock, *Kanitkar!*; Belgaum, *Ritchie,* 130!—DISTRIB. More or less throughout India on low hills.

14. MICROMERIA, Benth.

Herbs or undershrubs. Leaves usually small, entire or toothed. Flowers small; whorls few- or many-flowered in axillary or terminal spikes (rarely paniculate). Calyx 13-nerved, 5-toothed or 2-lipped. Corolla 2-lipped; tube straight; upper lip entire or notched, flattish; lower lip spreading, 3-fid. Stamens 4, didynamous, the lower pair longer, ascending, incurved with diverging tips; anther-cells distinct, parallel, at length divergent; connective usually thickened. Ovary 4-lobed; style 2-lobed, the lobes equal or the upper very short, the lower recurved, flattened. Fruit of 4 smooth dry ovoid or oblong nutlets; basal scar small.—DISTRIB. Species about 60, in all regions but Australia.

1. **Micromeria capitata,** *Benth. in DC. Prodr.* v. 12 (1848) p. 218. A highly aromatic herb 1–2 ft. high with woody rootstock; stems slender, erect, quadrangular, pubescent, sometimes tinged with purple. Leaves $\frac{1}{2}$–1 by $\frac{1}{4}$–$\frac{5}{8}$ in., ovate, subobtuse, pubescent on both sides, gland-dotted, crenate or entire, ciliate; petioles $\frac{1}{6}$–$\frac{1}{3}$ in long. Flowers in

verticillate distant cymes in the axils of floral leaves which become smaller upwards, the lower cymes pedunculate, the upper sessile, the whole forming a long spicate raceme; bracts small, linear-lanceolate, pubescent. Calyx in flower $\frac{1}{10}$ in. long, hairy and glandular; teeth $\frac{1}{30}$ in. long, lanceolate-subulate, erect, ciliate. Corolla $\frac{1}{8}$ in. long, pubescent outside, 2-lipped; upper lip pale-violet almost white, about $\frac{1}{30}$ in. long, oblong, subtruncate, slightly notched; lower lip darker violet, twice as long as the upper, 3-lobed, the lobes spreading, the middle one the largest. Nutlets $\frac{1}{30}$ in. long, ellipsoid, the inner face slightly angular, the dorsal face rounded, smooth, brown. Fl. B. I. v. 4, p. 649; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 852; Watt, Dict. Econ. Prod. v. 5, p. 244. *Micromeria Malcomiana*, Dalz. ex Dalz. & Gibs. Bo. Fl. (1861) p. 209. *M. piperita*?, Grah. Cat. p. 151 (*not* of Linn.).—Flowers: Apr.–May. VERN. *Karvat.*

Occurs in the Bombay Presidency on the Mahableshwar hills, where it is abundant on the banks of the river Yenna and in the Chinamen's gardens below the bund. DECCAN: Mahableshwar, *Graham, Law!, Dalzell!, Cooke!, Woodrow!*—DISTRIB. India (Behar, W. Himalaya, W. Peninsula).

15. **ANISOMELES,** R. Br.

Tall erect branching coarse often villous herbs. Flowers in axillary whorls or lax-flowered branched paniculate cymes. Calyx ovoid or tubular, straight; limb equally 5-toothed, but little enlarged in fruit. Corolla 2-lipped; tube short, annulate within; upper lip erect, entire, short; lower broad, spreading, 3-lobed, the lateral lobes small, the middle lobe large, 2-fid. Stamens 4, didynamous, exserted, the lower pair the longest; anthers of the upper pair 2-celled, those of the lower pair 1-celled, the cells transverse, parallel. Disk equal. Ovary 4-partite; style 2-fid, the lobes equal, subulate. Fruit of 4 ovoid obtuse dry nutlets; basal scar small.—DISTRIB. Tropical and Subtropical Asia and Australia; species about 8.

Stem and branches acutely quadrangular.
- Cymes few-flowered, pedunculate; corolla white; stem glabrous or slightly pubescent; leaves thin, narrowed at the base ... 1. *A. Heyneana.*
- Cymes many-flowered, sessile; corolla pale-purple; stem softly pubescent; leaves rather thick, truncate or rounded at the base ... 2. *A. ovata.*

Stem and branches obtusely quadrangular; cymes in dense whorls; corolla purple; stem densely woolly; leaves very thick, rounded or shortly cuneate at the base ... 3. *A. malabarica.*

1. **Anisomeles Heyneana,** *Benth. in Wall. Pl. As. Rar.* v. 1 (1830) p. 59. A tall erect herb reaching 5 ft. high, glabrous or slightly pubescent; stem and branches slender, acutely quadrangular. Leaves thin, green, 2–5 by $\frac{3}{4}$–2 in., smaller upwards, ovate-lanceolate, acuminate, crenate-serrate, glabrous or sparsely hairy, narrowed at the base; petioles $\frac{1}{4}$–$1\frac{1}{4}$ in. long. Flowers subsessile or shortly pedicellate, in pedunculate secund usually few-flowered cymes, the peduncles of the lower cymes reaching nearly 1 in. long, those of the upper cymes much shorter; floral leaves becoming smaller upwards, the uppermost very small; bracts $\frac{1}{6}$–$\frac{1}{5}$ in. long, linear, subobtuse. Calyx in flower reaching $\frac{1}{4}$–$\frac{1}{3}$ in. long with a few stiff hairs on the nerves that run into the teeth hairy inside with long slender white hairs and reticulately veined; teeth

$\frac{1}{8}$ in. long. Calyx in fruit slightly enlarged, pale-brown, becoming glabrous, showing the reticulate venation on the outside. Corolla reaching $\frac{3}{4}$ in. long, white or greenish-white, the lower lip tinged with pink; tube $\frac{1}{2}$ in. long; upper lip $\frac{1}{5}$ in. long, oblong, obtuse, entire; lower lip 3-lobed, the lateral lobes small, rounded, the middle lobe very large, deeply 2-fid. Filaments bearded. Nutlets $\frac{1}{12}$ in. long, broadly ovoid, obtuse, subcompressed, the inner face slightly angled, the dorsal face rounded, smooth, polished, dark-brown. Fl. B. I. v. 4, p. 672; Dalz. & Gibs. p. 210; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362.—Flowers: Oct.–Nov. VERN. *Chandhára.*

Stocks and *Dalzell* without localities in Herb. Kew.! KONKAN: *Law*!; Bassein, *Kanitkar*!; Matheran, *Cooke*!; S. Konkan, *Ritchie*, 540!; Salsette, common, *Dalzell & Gibson*. DECCAN: Mahableshwar, *Cooke*!, *H. M. Birdwood*; Sinhagad, *Bhiva*!; below Phonda Ghát, *Ritchie*, 540! S. M. COUNTRY: Badami, *Woodrow*.—DISTRIB. India (W. Peninsula).

2. **Anisomeles ovata,** *R. Br. in Ait. Hort. Kew.* ed. 2, v. 3 (1811) p. 364. Suffruticose, 2–5 ft. high, hirsute, pubescent or tomentose, rarely sparsely hairy; stems acutely quadrangular, softly pubescent. Leaves rather thick, 1½–4 by 1–2¼ in. (in one specimen from Mahableshwar 5 by 3 in.), ovate, acute, crenate-serrate, softly pubescent on both sides, base truncate, rounded or subcordate, rarely shortly cuneate; petioles $\frac{5}{8}$–1½ in. long, densely hairy. Flowers sessile or nearly so, in dense whorls which are distant below but approximated above to form a dense spicate inflorescence; bracts $\frac{1}{8}$–$\frac{1}{5}$ in. long, linear, clothed with long stiff hairs. Calyx $\frac{1}{4}$ in. long, hirsute with long stiff hairs; teeth lanceolate, acute, nearly as long as the tube, hairy on both sides, ciliate. Corolla $\frac{5}{8}$ in. long, light-purple with a deep-blue lower lip; tube $\frac{1}{6}$ in. long; upper lip $\frac{1}{4}$ in. long, oblong, rounded at the apex; lower lip much longer, 3-lobed, the lateral lobes small, rounded, the middle lobe $\frac{1}{5}$ in. long, deeply divided into 2 oblong lobes $\frac{1}{8}$ in. long (making the lower lip 4-lobed). Filaments bearded. Nutlets $\frac{1}{10}$ in. long, broadly ovoid with rounded ends, subcompressed, the inner face obtusely angled, the dorsal face rounded, smooth, polished, nearly black when ripe. Fl. B. I. v. 4, p. 672; Grah. Cat. p. 153; Dalz. & Gibs. p. 210; Wight, Icon. t. 865; Trim. Fl. Ceyl. v. 3, p. 384; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 853; Watt, Dict. Econ. Prod. v. 1, p. 255.—Flowers: Aug.–Oct. VERN. *Gopáli.*

Common everywhere, *Dalzell & Gibson*. KONKAN: Matheran, *Cooke*!; Malabar Hill, Bombay, *Graham*. DECCAN: Mahableshwar, *Cooke*!; Sinhagad, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 561!, *Stocks*!; Castlerock, *Kanitkar*! GUJARAT: Godra, *Cooke*!; Ankleshwar, *Kanitkar*!—DISTRIB. Throughout India; Ceylon, Malay Archipelago, China, Philippines.

3. **Anisomeles malabarica,** *R. Br. in Bot. Mag.* (1819) t. 2071. Shrubby, erect, 4–6 ft. high, densely tomentose or thickly woolly; stems slightly branched, obtusely quadrangular, clothed with soft white woolly hairs. Leaves very thick, 2½–4 by $\frac{3}{4}$–1¾ in., oblong-lanceolate, acute, pale above, white below, crenate-serrate, base rounded or shortly cuneate; petioles ½ in. long, stout, softly woolly. Flowers in dense whorls often 1½ in. in diam., distant below, approximate above, forming a more or less interrupted spicate inflorescence; bracts reaching ½ in. long, linear, acute, densely softly woolly. Calyx $\frac{3}{8}$ in. long, densely

villous; teeth about ½ as long as the tube, narrowly lanceolate, acute, villous on both sides, ciliate. Corolla purple, ⅛ in. long, slightly pubescent outside; tube ⅓ in. long; upper lip ⅓ in. long, obtuse; lower lip very large and broad, 3-lobed, the lateral lobes small, rounded, the middle lobe deeply divided at the apex into 2 oblong obtuse lobes. Filaments pubescent. Nutlets ⅛–⅙ in. long, ellipsoid, compressed, the inner face slightly angular, the dorsal face rounded, smooth, polished, brown. Fl. B. I. v. 4, p. 673; Grah. Cat. p. 153; Dalz. & Gibs. p. 210; Wight, Icon. t. 864; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Watt, Dict. Econ. Prod. v. 1, p. 254.—Flowers: Oct.-Nov. VERN. *Gojibhá.*

Dalzell without locality in Herb. Kew.! *Stocks* without locality in Herb. Kew.! DECCAN: near Pimpalgaon, *Edgeworth*!; Kartriz Ghát, *Cooke*!, *Woodrow*!, *H. M. Birdwood*, *Graham*; Kamatki Ghát, *Law* ex *Graham*. KANARA: *Law*!—DISTRIB. India (W. Peninsula); Penang, Mauritius.

16. **SCUTELLARIA,** Linn.

Herbs or undershrubs. Inflorescence various. Calyx campanulate, 2-lipped; lips closed in fruit, at length free to the base, the upper deciduous, furnished on the back with a deciduous scale or pouch, the lower lip persistent. Corolla 2-lipped; tube long, usually sharply recurved beyond the calyx and ascending, dilated at the throat, not annulate within; upper lip erect, galeate, entire or notched; lower lip broad, 3-lobed, the lateral lobes small, often united with the upper lip. Stamens 4, didynamous, the lower longest, ascending under the galeate upper lip; anthers conniving, ciliate, those of the upper stamens 2-celled, those of the lower 1-celled. Disk elongate. Ovary 4-partite, oblique; style 2-fid, the upper lobe very short. Fruit of 4 minute subglobose smooth granulate or hispidulous nutlets.—DISTRIB. Widely spread in the N. temperate regions and in mountains in the Tropics; species about 90.

1. **Scutellaria discolor,** *Coleb. in Wall. Pl. As. Rar.* v. 1 (1830) p. 66. Annual, pubescent; stems ascending from a creeping root-stock, 1–2 ft. high, rarely branched, often naked above. Leaves 1½–5 by ¾–3 in. (rarely orbicular), often crowded towards the base of the stem, elliptic, obtuse, crenate, pubescent, sometimes purple beneath, base rounded or cordate; petioles 1–3 in. long. Flowers scattered over the pubescent rhachis in slender racemes 2–8 in. long; bracts ⅒–⅙ in. long, lanceolate; pedicels ⅒ in. long. Calyx in flower ⅛ in. long, pubescent. Corolla pale-blue, scarcely pubescent outside, ½–⅝ in. long; tube ⅜ in. long, slightly dilated at the throat, sharply recurved near the base; upper lip galeate, obtuse; lower lip 3-lobed. Nutlets ⅓⅒ in. long, scabrid. Fl. B. I. v. 4, p. 667; Dalz. & Gibs. p. 210; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362. *Scutellaria indica*, Blume, Bijdr. (1826) p. 839 (*not* of Linn.); Grah. Cat. p. 152.—Flowers: Sept.-Nov.

DECCAN: Mahableshwar, *Gibson* ex *Graham*, *H. M. Birdwood*. S. M. COUNTRY: Párva Ghát, *Dalzell & Gibson*; Castlerock, *Cooke*!, *Woodrow*!, *Kanitkar*! KANARA: plentiful, *Dalzell & Gibson*; Kála naddi, *Ritchie*, 1991!; Falls of Gairsoppa, *Talbot*, 255!—DISTRIB. India (Subtropical Himalaya, Birma, W. Peninsula); Java.

17. **LEONURUS,** Linn.

Erect leafy stout herbs. Leaves lobed. Flowers small, in dense-flowered axillary distant whorls. Calyx 5-nerved, turbinate; teeth 5, spreading, spinescent. Corolla 2-lipped; tube naked or annulate within; upper lip entire, erect; lower lip 3-fid, the middle lobe obcordate. Stamens 4, didynamous, the lower pair the longest; filaments ascending; anthers conniving, the cells transverse. Disk uniform. Ovary 4-partite; style 2-fid, the lobes equal, obtuse or subulate. Fruit of 4 triquetrous smooth dry nutlets with truncate apices; basal scar small.—DISTRIB. Europe, Asia, Africa, America; species 10.

1. **Leonurus sibiricus,** *Linn. Sp. Pl.* (1753) p. 584. Annual, 2–6 ft. high; stems obtusely quadrangular, furrowed, usually softly pubescent. Leaves 1½–4 in. long, palmatipartite with linear incised segments, glabrous or nearly so above, pale and more or less pubescent on the veins beneath; nerves strong below; petioles reaching 2 in. long. Flowers in axillary whorls; upper floral leaves usually entire; bracts ⅛ in. long, spinescent. Calyx ¼–⅓ in. long, glabrous or slightly pubescent, 5-nerved; tube ⅛ in. long; teeth spinescent from a triangular base. Corolla red, reaching ½ in. long; tube about equalling the limb, annulate within; upper lip obovate, galeate, entire, pubescent; lower lip about equalling the upper, 3-lobed, the middle lobe obcordate, the 2 lateral lobes smaller, rounded. Nutlets $\frac{1}{10}$ in. long, triquetrous, truncate. Fl. B. I. v. 4, p. 678; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 854; Watt, Dict. Econ. Prod. v. 4, p. 625. *Leonurus tataricus,* Roxb. Fl. Ind. v. 3, p. 8; Grah. Cat. p. 152; Dalz. & Gibs. Suppl. p. 67.—Flowers: Sept.

Doubtfully indigenous. KONKAN: Bombay, *Woodrow*; Santaveri, *Woodrow.* S. M. COUNTRY: Belgaum (introduced), *Stocks,* 557!; gardens in Belgaum where it is naturalized, *Law* ex *Graham.*—DISTRIB. India (Bengal, Silhet, W. Peninsula); Tropical Asia, Africa, and America.

18. **LEUCAS,** R. Br.

Herbs or undershrubs usually woolly or villous. Flowers usually white, in axillary generally distant whorls. Calyx 10-nerved, striate; mouth equal or oblique, equally or unequally 6–10-toothed. Corolla 2-lipped; tube included, annulate or naked within; upper lip erect, concave, externally villous; lower lip spreading, 3-fid, the midlobe large. Stamens 4, didynamous, the lower pair the longest; filaments ascending; anthers conniving, the cells divaricate, at length confluent. Disk entire or lobed, equal or glandular in front. Ovary 4-partite; style subulate at the apex, the upper lobe obsolete. Fruit of 4 ovoid triquetrous obtuse dry nutlets; basal scar small.—DISTRIB. Species about 100, chiefly Asiatic and African.

Calyx-mouth oblique.
- Mouth of calyx much produced below ..... 1. *L. urticifolia.*
- Mouth of calyx produced above.
  - Calyx-teeth very short.
    - Calyx-mouth not villous within.
      - Calyx smooth below, ribbed and hispid above ..... 2. *L. aspera.*
      - Calyx smooth throughout or nearly so; calyx-mouth very oblique ..... 3. *L. linifolia.*

Calyx-mouth villous within.
Leaves linear, less than $\frac{1}{2}$ in. broad, entire; whorls less than 1 in. in diam.; bracts linear, $\frac{1}{4}$ in. long. 4. *L. zeylanica.*
Leaves ovate, more than $\frac{1}{2}$ in. broad, crenate-serrate; whorls more than 1 in. in diam.; bracts lanceolate, more than $\frac{1}{4}$ in. long ..... 5. *L. Cephalotes.*
Calyx-teeth long and slender.
Lower lip of corolla very little longer than the upper; tube annulate within; leaves not exceeding 2 in. long ..... 6. *L. nutans.*
Lower lip of corolla twice as long as the upper; tube not annulate within; leaves exceeding 2 in. long ... 7. *L. martinicensis.*
Calyx-mouth straight or nearly so.
Calyx-teeth erect.
Whorls 6–many-flowered.
Calyx-teeth long, unequal; flowers solitary in terminal whorls; bracts $\frac{3}{8}$ in. long, rigid ..... 8. *L. stricta.*
Calyx-teeth very short; whorls axillary.
Hairs on the stem and branches erect or spreading.
Leaves narrowly linear, entire, not exceeding $\frac{1}{4}$ in. wide; bracts $\frac{1}{16}$ in. long ..... 9. *L. longifolia.*
Leaves ovate, $\frac{1}{2}$ in. or more wide, crenate; bracts $\frac{1}{8}$–$\frac{1}{4}$ in. long ..... 10. *L. lanata.*
Hairs on the stem and branches deflexed.
Suffruticose, erect; stem and branches stout..... 11. *L. montana.*
A straggling weak (sometimes climbing) herb with slender branches ..... 12. *L. mollissima.*
Whorls 1–4-flowered.
Pubescent all over; pedicels $\frac{1}{16}$–$\frac{1}{8}$ in. long ..... 13. *L. biflora.*
Glabrous or nearly so; pedicels $\frac{1}{8}$ in. long ..... 14. *L. procumbens.*
Calyx-teeth stellately spreading in fruit; whorls terminal and axillary.
Hairs on the stem erect or spreading; calyx $\frac{1}{8}$–$\frac{3}{8}$ in. long ..... 15. *L. stelligera.*
Hairs on the stem deflexed and spreading; calyx $\frac{1}{2}$–$\frac{3}{4}$ in. long ..... 16. *L. ciliata.*

1. **Leucas urticifolia,** *R. Br. Prodr.* (1810) p. 504. A finely tomentose or hoary branched annual. Stems obtusely quadrangular, finely pubescent. Leaves thin, $1\frac{3}{4}$–3 by 1–$1\frac{1}{2}$ in., ovate, acute, coarsely crenate-serrate, more or less pubescent, base acute or rounded; petioles $\frac{1}{2}$–1 in. long. Flowers in many-flowered dense distant globose whorls reaching 1 in. in diam.; bracts $\frac{3}{8}$ in. long, linear-lanceolate, acute, aristate, substipitate, ciliate, reticulately veined. Calyx $\frac{1}{3}$–$\frac{1}{2}$ in. long, cylindric, pubescent or villous; mouth very oblique, about 10-toothed, somewhat 2-lipped, the upper lip very small with minute spinescent teeth, the lower membranous, reticulately veined, much prolonged, the 3 lowest teeth the largest, spinescent from a triangular base. Corolla white; tube $\frac{1}{5}$ in. long, not annulate within; upper lip obovate, concave, externally villous; lower lip 3-lobed, the middle lobe large, 2-fid, the lateral lobes small, obtuse. Nutlets $\frac{1}{12}$ in. long, obovoid-oblong, obtuse, trigonous, obliquely truncate and glandular at the apex, smooth, brown. Fl. B. I. v. 4, p. 680; Dalz. & Gibs. p. 212; Wight, Icon. t. 1451; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 854.—Flowers: Nov.

Dalzell without locality in Herb. Kew.! Deccan: widely, *Woodrow.* Gujarat: Ahmedabad, *Woodrow*; Cambay, *Dalzell & Gibson.* Sind: *Stocks*!; Jemadar ka Landa near Karachi, *Stocks*!—Distrib. India (Bengal, Panjáb, W. Peninsula); Beluchistan, Arabia, Abyssinia.

2. **Leucas aspera,** *Spreng. Syst.* v. 2 (1825) p. 743. A variable annual 6–18 in. high; stem erect, usually much diffusely branched from below, stout, hispid or scabrid; branches quadrangular, hispid. Leaves subsessile or shortly petiolate, 1–3 by ¼–½ in., linear-oblong or oblong-lanceolate, obtuse, entire or crenate, more or less hairy, base tapering; petioles $\frac{1}{10}$–¼ in. long. Flowers sessile or nearly so, in terminal and axillary whorls reaching 1 in. in diam.; bracts up to rather more than ¼ in. long, linear, acute, bristle-tipped, ciliate with long slender hairs. Calyx variable, tubular, ⅓–½ in. long; tube curved, contracted above the nutlets, the lower half usually quite glabrous and membranous, the upper half ribbed, hispid or scabrid; mouth small, very oblique, not villous, the upper part produced forward; teeth small, triangular, bristle-tipped, ciliate, the upper tooth the largest. Corolla white, ⅜ in. long; tube ⅕ in. long, enlarged and pubescent above, annulate about the middle; upper lip ⅛ in. long, densely-white-woolly; lower lip about twice as long, the middle lobe obovate, rounded, the lateral lobes small, subacute. Nutlets $\frac{1}{10}$ in. long, oblong, subtruncate at the apex; inner face sharply angular, the dorsal face rounded, smooth, brown. Fl. B. I. v. 4, p. 690; Grah. Cat. p. 153; Dalz. & Gibs. p. 211; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 854; Watt, Dict. Econ. Prod. v. 4, p. 632.—Flowers: Oct.

Stocks without locality in Herb. Kew. 317 *a*! KONKAN: *Law*!; sea-shore at Ravi, *Stocks*!; Alibág sea-shore, *Dalzell & Gibson.* DECCAN: *Woodrow.*—DISTRIB. More or less throughout India in the plains; Mauritius, Java, Philippines.

3. **Leucas linifolia,** *Spreng. Syst.* v. 2 (1825) p. 743. Herbaceous, erect, slightly pubescent or tomentose, 1–2½ ft. high, usually branched; branches quadrangular, pubescent. Leaves 1¾–3½ by ¼–½ in., linear-lanceolate, obtuse, entire or remotely serrate, appressedly pubescent or nearly glabrous, base tapering; petioles 0–½ in. long. Flowers subsessile or shortly pedicellate, in axillary and terminal whorls ½–¾ in. in diam., towards the ends of the branches; bracts ⅕–⅓ in. long, narrowly linear-subulate, bristle-tipped, finely pubescent. Calyx ⅜ in. long from the base to top of uppermost tooth, ⅛–⅕ in. long from the base to top of lowest tooth, entirely glabrous or slightly pubescent; mouth glabrous, very oblique, contracted; the upper tooth very large, very acute, much produced forwards, the other teeth minute, distant, erect along the oblique margin. Corolla white, nearly ½ in. long; tube ¼ in. long, annulate inside about the middle; upper lip ⅕ in long, white-woolly; lower lip ¼ in. long, the middle lobe large, obovate, rounded, the lateral lobes small. Nutlets ⅛ in. long, oblong, rounded at the apex, the inner face sharply angular, the dorsal face rounded, brown.

The calyx is quite different from that of any other species of Bombay *Leucas.* Fl. B. I. v. 4, p. 690; Grah. Cat. p. 153; Dalz. & Gibs. p. 211; Prain, Beng. Pl. p. 854; Watt, Dict. Econ. Prod. v. 4, p. 633.—Flowers: Sept.–Nov. VERN. *Goma.*

A common plant throughout the Konkan and Deccan in cultivated fields, conspicuous when the crops are off.—DISTRIB. More or less throughout India; Mauritius, Malaya.

4. **Leucas zeylanica,** *R. Br. Prodr.* (1810) p. 504. Annual, erect, 6–18 in. high, hispid with long hairs, much-branched from near

the base; branches quadrangular, grooved, hispid with long spreading hairs. Leaves subsessile, variable, 1–3 by $\frac{1}{8}$–$\frac{1}{2}$ in., linear or linear-lanceolate, obtuse, the margins often slightly recurved, entire or serrulate, hispid on both sides, ciliate with often bulbous-based hairs, base tapering; midrib conspicuous beneath, hairy. Flowers sessile or nearly so, usually in terminal whorls $\frac{1}{2}$–$\frac{3}{4}$ in. in diam.; bracts $\frac{1}{4}$ in. long, linear, spinous-pointed, ciliate with long bulbous-based hairs. Calyx $\frac{1}{4}$ in. long, turbinate, slightly curved, the lower part glabrous or slightly pubescent outside, the upper part with a few long scattered spreading hairs; mouth broad, oblique, the upper part projecting forward, villous, the villi shorter than the calyx-teeth; upper tooth of calyx longer than the others, $\frac{1}{20}$ in. long, triangular, acute, the other teeth subequal, about $\frac{1}{30}$ in. long, subulate. Corolla white, $\frac{3}{4}$ in. long; tube $\frac{1}{4}$ in. long, the upper part enlarged, pubescent; upper lip $\frac{1}{8}$ in. long, densely white-woolly, the middle lobe broadly obovate, cuneate, rounded or subtruncate, emarginate, the lateral lobes very small. Nutlets $\frac{1}{8}$ in. long, obovoid-oblong, rounded or truncate at the apex, the inner face sharply angular, the dorsal face rounded, smooth, brown. Fl. B. I. v. 4, p. 689; Wight, Ill. t. 176; Trim. Fl. Ceyl. v. 3, p. 387; Watt, Dict. Econ. Prod. v. 4, p. 634. *Leucas diffusa*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362 (*not* of Benth.).—Flowers: Oct.

Rare. S. M. Country: Badami, *Woodrow*!—Distrib. India (Assam, Birma, Chittagong, W. Peninsula); Malaya, Ceylon, China.

5. **Leucas Cephalotes,** *Spreng. Syst.* v. 2 (1825) p. 743. An annual hairy and pubescent herb 2–3 ft. high; stems and branches obtusely quadrangular, hairy with spreading hairs. Leaves 1½–3 by ½–1 in., ovate or ovate-lanceolate, subacute, membranous, more or less pubescent, crenate-serrate, base tapering; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers sessile, in large globose dense terminal whorls 1–2 in. in diam.; floral leaves like the cauline, the uppermost coming out from the top of the verticil; bracts imbricate, foliaceous, green, thin, membranous, $\frac{1}{2}$–$\frac{5}{8}$ by $\frac{1}{10}$–$\frac{1}{5}$ in., lanceolate, acute, awned, reticulately veined, ciliate. Calyx tubular, slighty curved, reaching $\frac{5}{8}$ in. long, the lower half of the tube quite glabrous, membranous, and smooth outside, the upper half pubescent outside and inside; mouth oblique, the villi nearly as long as the teeth; teeth subequal, $\frac{1}{20}$ in. long, narrowly triangular-subulate. Corolla $\frac{3}{4}$ in. long; tube less than $\frac{1}{2}$ in. long, obliquely annulate about the middle; upper lip $\frac{1}{6}$ in. long, white-woolly; lower lip nearly twice as long as the upper, the middle lobe large, truncate, the lateral lobes very small. Nutlets $\frac{1}{8}$ in. long, obovoid-oblong, rounded at the apex, the inner face angular, the dorsal face rounded, smooth, brown. Fl. B. I. v. 4, p. 689; Grah. Cat. p. 153; Dalz. & Gibs. p. 211; Wight, Icon. t. 337; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 855; Watt, Dict. Econ. Prod. v. 4, p. 633.—Flowers: Nov.

Gujarat: coast of Kathiawar, *Dalzell & Gibson*; Ahmedabad common, *Law* ex *Graham*; Chandod, *Woodrow*.—Distrib. India (Bengal, Panjáb, Assam, Himalayas, W. Peninsula); Afghanistan.

6. **Leucas nutans,** *Spreng. Syst.* v. 2 (1825) p. 743. A dwarf often straggling annual, sometimes less than 2 in. high in Sind specimens, but reaching 1 ft. high under favorable conditions, diffusely

branched from near the base; stems and branches quadrangular, laxly hirsute with long usually spreading hairs. Leaves 1–2 by $\frac{1}{4}$–1 in., oblong or oblong-lanceolate, obtuse, subserrate, hairy or nearly glabrous, gland-dotted; petioles 0–$\frac{1}{8}$ in. long. Flowers sessile or subsessile, in terminal and axillary dense many-flowered whorls reaching $\frac{3}{4}$ in. in diam.; bracts $\frac{1}{5}$–$\frac{1}{3}$ by $\frac{1}{20}$–$\frac{1}{16}$ in., thin, foliaceous, lanceolate, acute, finely spinous-tipped, veined, ciliate with long weak hairs. Fruiting calyx strongly ribbed, $\frac{3}{8}$ in. long, hispid, falcately decurved; tube pubescent within; mouth slightly oblique, the villi erect, slender not dense, shorter than the teeth; teeth 10, the uppermost tooth larger than the others, which are subequal and about $\frac{1}{10}$ in. long, lanceolate, spinous-tipped, ciliate. Corolla white, exceeding $\frac{1}{2}$ in. long; tube $\frac{1}{3}$ in. long, slender, slightly annulate near the base; upper lip $\frac{1}{8}$ in. long, white-woolly; lower lip $\frac{1}{4}$ in. long, the middle lobe large, obovate, rounded. Nutlets $\frac{1}{8}$ in. long, narrowly oblong-ellipsoid, rounded at the apex, the inner face angular, the dorsal face rounded, smooth, brown. Fl. B. I. v. 4, p. 688; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 855. *Leucas vestita*, Woodr. in Journ. Bomb. Nat. l. c. (*not* of Benth.).—Flowers: Aug.

S. M. Country: Karlimatti, *Woodrow*; Badami, *Cooke*! Sind: *Stocks*!; Jemadar ka Landa near Karachi, *Stocks*, 1179!—Distrib. India (N. and N.W. Provinces, Behar, Birma, W. Peninsula).

7. **Leucas martinicensis,** *R. Br. Prodr.* (1810) p. 504. A tall stout annual 2–4 ft. high, more or less branched; stem and branches obtusely quadranglar, grooved, hairy. Leaves $2\frac{1}{2}$–$3\frac{1}{2}$ by 1–$1\frac{3}{4}$ in., membranous, ovate or oblong-lanceolate, obtuse, coarsely crenate-serrate, hairy on both sides, base cuneate (rarely rounded); petioles $\frac{3}{8}$–$\frac{3}{4}$ in. long. Flowers sessile, in numerous distant axillary globose whorls $\frac{3}{4}$–$1\frac{1}{4}$ in. in diam.; floral leaves narrower than the cauline ones, often sessile; bracts green, reaching $\frac{1}{3}$ in. long, narrowly linear-lanceolate or subulate, finely spinous-pointed with pale slender awns. Calyx $\frac{1}{2}$ in. long, tubular, sigmoidly curved, pubescent; tube glabrous and closely reticulately veined within; mouth oblique, the villi few and short; teeth lanceolate, finely spinous-tipped, ciliate, the upper tooth large, $\frac{1}{6}$ in. long, the other teeth subequal, about $\frac{1}{10}$ in. long. Corolla white, $\frac{1}{3}$ in. long; tube $\frac{1}{5}$ in. long, not annulate within; upper lip $\frac{1}{12}$ in. long, white-woolly; lower lip very little longer than the upper, $\frac{1}{10}$ in. long, the middle lobe oblong, 2-fid, the lateral lobes large, oblong, rounded. Nutlets $\frac{1}{10}$ in. long, obovoid-oblong, obliquely cut at the apex on the ventral side; inner face angular, the dorsal rounded, smooth, shining, dark brown. Fl. B. I. v. 4, p. 688; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 855. —Flowers: Oct.–Feb.

Doubtfully indigenous. *Dalzell* without locality in Herb. Kew.! Deccan: Karli (Poona districts), *Cooke*!; Poona, *Cooke*!, *Woodrow*. S. M. Country: Belgaum, *Ritchie*, 560!; hills N.E. of Belgaum, *Stocks*!; Badami, *Woodrow*! Kanara: Halyál, *Ritchie*, 560!—Distrib. India (Chota Nagpur, Birma, W. Peninsula); Tropical Africa and America, W. Indies.

8. **Leucas stricta,** *Benth. in Wall. Cat.* (1828) 2045. Herbaceous, erect, 6–12 in. high, branched from near the base; branches quadrangular, grooved, hispid with spreading hairs. Leaves 1–$2\frac{1}{2}$ by $\frac{1}{6}$–$\frac{1}{2}$ in.,

linear-oblong or oblong-lanceolate, obtuse, entire, hispidly hairy, narrowed at the base, green on both sides (the floral leaves like the cauline ones); midnerve prominent beneath; petioles 0–$\frac{1}{8}$ in. long. Flowers shortly pedicellate, in terminal solitary many-flowered whorls $\frac{1}{2}$–$\frac{3}{4}$ in. in diam.; bracts $\frac{3}{8}$ in. and even more long, linear, acute, rigid, spinous-pointed, ciliate with long stiff often bulbous-based hairs which are sometimes $\frac{1}{3}$ in. long; pedicels $\frac{1}{20}$–$\frac{1}{10}$ in. long. Calyx $\frac{3}{8}$ in. long, straight or slightly curved, finely pubescent and also sparsely hispid with long white hairs, glabrous and reticulately veined within; mouth nearly straight, villous with long erect hairs which project between the teeth but are shorter than them; teeth unequal, the longest about $\frac{1}{6}$ in. long, subulate, ciliate. Corolla white, nearly $\frac{3}{4}$ in. long; tube $\frac{1}{3}$ in. long, annulate below the middle; upper lip scarcely $\frac{1}{4}$ in. long, densely white-villous; lower lip nearly $\frac{1}{2}$ in. long, the middle lobe large, obovate, rounded, the lateral lobes very short, obtuse. Nutlets $\frac{1}{8}$ in. long, oblong, rounded at the apex, the inner face angular, the dorsal face rounded, smooth, brown. Fl. B. I. v. 4, p. 688; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 855.—Flowers: Aug.

S. M. Country: Sandstone hills N.E. of Belgaum, *Ritchie*, 550!; Karlimatti, *Woodrow*; Dharwar, *Woodrow*; Badami, *Cooke*!—Distrib. India (W. Peninsula).

9. **Leucas longifolia,** *Benth. Lab. Gen. & Sp.* (1835) p. 744. An erect rigid herb 10–20 in. high; stem simple below, branched above; branches obtusely quadrangular, pubescent with erect or spreading hairs. Leaves $\frac{5}{8}$–$2\frac{1}{2}$ by $\frac{1}{25}$–$\frac{1}{4}$ in., sessile or shortly petiolate, linear, entire, obtuse or subacute, more or less pubescent, tapering towards the base; midnerve strong below. Flowers in few-flowered axillary whorls often approximated near the top so as to form a leafy spike; bracts $\frac{1}{16}$ in. long, subulate, hairy. Calyx $\frac{1}{4}$ in. long, turbinate, pubescent outside; mouth truncate, furnished with white erect stiff short hairs which stand up between the teeth; teeth 10, very small. Corolla $\frac{2}{3}$ in. long; tube $\frac{1}{3}$ in. long, annulate with a ring of hairs about the middle; upper lip $\frac{1}{5}$ in. long, densely silky-villous; lower lip $\frac{1}{3}$ in. long, the middle lobe suborbicular, entire. Nutlets $\frac{1}{10}$ in. long, obovoid-oblong, trigonous. Fl. B. I. v. 4, p. 684; Grah. Cat. p. 153; Dalz. & Gibs. p. 210; Trim. Fl. Ceyl. v. 3, p. 386; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362.—Flowers: July–Aug. Vern. *Dudháni.*

Dalzell without locality in Herb. Kew.! Konkan: *Stocks*!, *Hooker*! Deccan: widely, *Woodrow*; Poona, *Jacquemont*!, *Cooke*!, *Graham, Dalzell & Gibson.*—Distrib. India (W. Peninsula); Ceylon.

10. **Leucas lanata,** *Benth. in Wall. Pl. As. Rar.* v. 1 (1830) p. 61. Whole plant densely softly woolly or subsilky, 2–3 ft. high; rootstock stout, woody, perennial; stem and branches stout, obtusely quadrangular, with erect hairs. Leaves 1–$2\frac{1}{2}$ by $\frac{1}{2}$–$1\frac{1}{4}$ in., thick, ovate, obtuse or acute, more or less deeply crenate, rugose, velvety, base rounded or cuneate; petioles 0–$\frac{1}{4}$ in. long. Flowers sessile, in many-flowered axillary whorls; bracts $\frac{1}{8}$–$\frac{1}{4}$ in. long, linear, densely hairy and ciliate. Calyx $\frac{1}{3}$ in. long, densely silky outside, the upper half of the tube pubescent inside; mouth truncate; teeth small, reaching $\frac{1}{16}$ in. long, triangular-subulate, alternately shorter. Corolla white, rather

more than ½ in. long; tube as long as the calyx, annulate above the middle; upper lip densely silky on both sides; middle lobe of lower lip broadly obovate, 2-fid. Nutlets $\frac{1}{16}$ in. long, oblong-obovoid, trigonous, obliquely truncate at the apex. Fl. B. I. v. 4, p. 681. *Leucas collina*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 338; Dalz. & Gibs. p. 211.—Flowers: Oct.

KONKAN: low hills, *Dalzell*!; S. Konkan, *Dalzell & Gibson*. KANARA, *Law*!—DISTRIB. India (W. Himalaya, Behar, W. Peninsula); S. China.

11. **Leucas montana,** *Spreng. Syst.* v. 2 (1825) p. 742. Suffruticose, densely softly woolly or tomentose; branches woody, the upper tetragonal, densely clothed with deflexed hairs. Leaves 1–2 by ½–1½ in., ovate or ovate-rotundate, obtuse, thick, crenate, usually green and clothed with silky hairs above, velvety-villous beneath, base usually rounded, truncate or subcordate; petioles ⅛–⅜ in. long. Flowers in axillary distant few- or many-flowered whorls; bracts $\frac{1}{16}$–⅛ in. long, linear. Calyx subsessile, ¼–⅓ in. long, straight, silky-villous outside, the upper half finely pubescent inside; mouth truncate; teeth minute, triangular-subulate, the alternate ones shorter. Corolla white, nearly ½ in. long; tube ¼ in. long, annulate within; upper lip densely woolly; middle lobe of lower lip broadly obovate, 2-fid. Fl. B. I. v. 4, p. 682; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 855.—Flowers: Nov.–Apr.

DECCAN: Purandhar Fort, *Cooke*!, *Woodrow*!; Sinhagad hill, *Woodrow*!; Bhor, *Woodrow*.—DISTRIB. India (Chota Nagpur, Orissa, Behar, W. Peninsula).

12. **Leucas mollissima,** *Wall. Pl. As. Rar.* v. 1 (1830) p. 62. A straggling weak much-branched hoary-tomentose herb, often climbing among bushes (*Ritchie*); stem and branches slender, quadrangular, 3–4 ft. long, pubescent with appressed deflexed hairs. Leaves 1½–2½ by ½–1 in., ovate or ovate-lanceolate, acute (rarely obtuse), serrate, sparsely hairy with appressed hairs above, densely softly hairy beneath with white hairs; petioles 0–¼ in. long. Flowers in distant many-flowered whorls; bracts ⅛–⅕ in. long, linear, hairy. Calyx ¼–⅓ in. long, subsessile, softly silky-villous outside, the upper half inside densely silky-pubescent; teeth 10, triangular-subulate, about $\frac{1}{20}$ in. long, nearly equal or the alternate teeth smaller. Corolla white, ½ in. long; tube annulate within above the middle; lower lip broadly obovate, 2-fid. Nutlets $\frac{1}{12}$ in. long, obovoid, trigonous, obliquely truncate at the apex, brown. Fl. B. I. v. 4, p. 682; Trim. Fl. Ceyl. v. 3, p. 385; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 855; Watt, Dict. Econ. Prod. v. 4, p. 634.—Flowers: Aug.–Dec.

KONKAN: *Stocks*!, *Dalzell*! S. M. COUNTRY: Belgaum hills, *Ritchie*, 559! KANARA: Kála naddi, *Ritchie*, 1992!—DISTRIB. India (Subtropical Himalaya, Behar, Chota Nagpur, W. Bengal, Orissa, W. Peninsula); Ceylon, China.

13. **Leucas biflora,** *R. Br. Prodr.* (1810) p. 504. Procumbent, pubescent; branches long, slender, 1–2 in. long, quadrangular, pubescent with deflexed hairs. Leaves variable, ⅝–2 by ¼–⅞ in., ovate or elliptic or oblong, acute or obtuse, coarsely and distantly serrate, pubescent on both sides; petioles ¼–⅜ in. long. Flowers in distant axillary whorls of 1–4 (rarely more) very commonly 2; pedicels $\frac{1}{30}$–⅛ in. long; bracts small, subulate. Calyx pubescent, reticulately veined, reaching ⅜ in.

long, narrowed at the base; teeth reaching sometimes $\frac{1}{8}$ in. long, subequal, lanceolate-subulate, ciliate. Corolla white, $\frac{5}{8}$ in. long; tube $\frac{3}{8}$ in. long, annulate within about the middle; middle lobe of lower lip emarginate. Nutlets $\frac{1}{12}$ in. long, oblong, trigonous, truncate. Fl. B. I. v. 4, p. 683; Grah. Cat. p. 153; Dalz. & Gibs. p. 211; Trim. Fl. Ceyl. v. 3, p. 386; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362.—Flowers: Oct.

KONKAN: *Dalzell & Gibson, Stocks*! DECCAN: Dongergaon near Ahmednagar, *Cooke*!; Devathan, *Bhiva*!; Bhor, *Kanitkar*! GUJARAT: *Woodrow*.—DISTRIB. India (W. Peninsula); Ceylon.

14. **Leucas procumbens,** *Desf. in Mém. Mus. Par.* v. 11 (1824) p. 7, t. 3, f. 2. Procumbent, branched; rootstock woody; stems and branches long, slender, quadrangular, reaching 2–3 ft. long, more or less pubescent on the angles. Leaves membranous, $\frac{3}{4}$–$1\frac{3}{4}$ by $\frac{1}{2}$–$\frac{3}{4}$ in., elliptic-lanceolate, acute, serrate, nearly glabrous, base usually acute; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers in axillary lax whorls of 1–3 pedicellate flowers; pedicels reaching $\frac{1}{5}$ in. long, filiform; bracts small, subulate. Calyx $\frac{3}{8}$–$\frac{1}{2}$ in. long, pubescent, nearly glabrous, reticulately veined; mouth truncate; base narrowed; teeth 10, nearly equal, lanceolate, acute, rarely reaching $\frac{1}{10}$ in. long, ciliate. Corolla white, $\frac{5}{8}$ in. long; tube $\frac{3}{8}$ in. long, annulate about the middle; middle lobe of lower lip emarginate. Nutlets $\frac{1}{12}$ in. long, obovoid, trigonous, truncate at the apex. Fl. B. I. v. 4, p. 683; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 855.—Flowers: Aug.-Oct.

I cannot find any really *good* specific character to separate this species from *Leucas biflora*. The amount of pubescence seems to be the chief difference. The pedicels in *L. procumbens* are usually longer than those of *L. biflora*. The difference in the length of the calyx-teeth cannot be relied upon as a good distinguishing character.

S. M. COUNTRY: Belgaum, *Ritchie*, 558! KANARA: N. Kanara, *Law*!; Halyál, *Ritchie*, 558!—DISTRIB. India (Bengal, W. Peninsula).

15. **Leucas stelligera,** *Wall. Pl. As. Rar.* v. 1 (1830) p. 61. Herbaceous, erect, branched, softly pubescent or villous, 2–3 ft. high; stem and branches obtusely quadrangular, hairy with erect and spreading hairs. Leaves 2–4 by $\frac{3}{8}$–1 in., elliptic-lanceolate or oblong-lanceolate, obtuse or subacute, obtusely serrate, green above, pale beneath, clothed on both sides with long soft hairs, base tapering into the petiole; nerves numerous, prominent beneath, impressed above; petioles $\frac{1}{8}$–$\frac{1}{2}$ in. long. Flowers sessile, in dense many-flowered terminal and axillary whorls reaching sometimes $1\frac{1}{2}$ in. in diam.; bracts reaching $\frac{1}{4}$ in. or more long, linear, revolute at the apex, densely ciliate. Calyx $\frac{1}{5}$–$\frac{3}{8}$ in. long, pubescent or tomentose, glandular; mouth truncate, densely hairy within with erect hairs; teeth about $\frac{1}{16}$ in. long, linear, soft, densely ciliate, stellately spreading in fruit, the tips revolute. Corolla white, rather less than $\frac{1}{2}$ in. long; tube rather more than $\frac{1}{4}$ in. long, annulate below the middle; lips of limb nearly equal, the upper very densely woolly with long white hairs, the middle lobe of the lower lip suborbicular, shortly 2-fid, the lateral lobes triangular-oblong, obtuse. Nutlets $\frac{1}{10}$ in. long, oblong-obovoid, rounded at the apex, the inner face angular, the dorsal face rounded, smooth and shining, brown. Fl. B. I. v. 4, p. 686; Dalz. & Gibs. p. 211; Woodr. in Journ.

Bomb. Nat. v. 12 (1899) p. 362.—Flowers: Nov. VERN. *Goma*; *Burumbi*.

KONKAN: *Stocks*!, *Law*!; Matheran, *Cooke*!; Wari jungles, *Dalzell*! DECCAN: Mahableshwar, very common, *Cooke*!; Sinhagad, *Gangaram*! S. M. COUNTRY: Belgaum hills, *Ritchie*, $\frac{556}{3}$!; Rámghát, *Ritchie*, 556!—DISTRIB. India (W. Peninsula).

16. **Leucas ciliata,** *Benth. in Wall. Pl. As. Rar.* v. 1 (1830) p. 61. Herbaceous or almost suffrutescent, much-branched, 1–3 ft. high; stem and branches quadrangular, hairy with deflexed and spreading hairs. Leaves with an aromatic and somewhat agreeable odor, $2\frac{1}{2}$–5 by 1–2 in., elliptic-lanceolate, acute, green above, paler below, sparsely clothed above and on the midrib and nerves beneath with short stout often bulbous-based hairs; petioles $\frac{1}{4}$–$\frac{5}{8}$ in. long. Flowers in terminal and axillary many-flowered dense globose whorls 1–$1\frac{1}{2}$ in. in diam., crinite from the slender long bracts and calyx-teeth; bracts $\frac{1}{2}$ in. long, linear or linear-lanceolate, shortly spinous-pointed, ciliate. Calyx more or less hairy outside, $\frac{1}{2}$–$\frac{3}{4}$ in. long; tube nearly glabrous inside, reticulately veined; mouth truncate, with a narrow raised hairy ring just below the teeth; teeth $\frac{1}{8}$–$\frac{1}{6}$ in. long, lanceolate, ciliate, shortly spinous-pointed, stellately spreading in fruit. Corolla reaching $\frac{7}{8}$ in. long; tube $\frac{1}{2}$ in. long, annulate within about the middle; upper lip $\frac{1}{4}$ in. long, densely clothed with yellowish-brown hairs; lower lip $\frac{3}{8}$ in. long or more, pure white; the middle lobe entire or emarginate, the lateral lobes short, broad, oblong, rounded. Nutlets $\frac{1}{8}$–$\frac{1}{6}$ in. long, oblong-obovoid, rounded at the apex, angular on the inner, rounded on the dorsal face, smooth, brown. Fl. B. I. v. 4, p. 687; Dalz. & Gibs. p. 211; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362.—Flowers: Oct.-Jan. VERN. *Burumbi*.

KONKAN: N. & S. Konkan, *Law*!; Banda in the Wari country, *Stocks*!, *Dalzell & Gibson*. DECCAN: Mahableshwar, abundant, *Cooke*!, *H. M. Birdwood*. KANARA: Yellapur (N. Kanara), *Talbot*, 253!—DISTRIB. India (Nipal, Sikkim, Khasia Mountains, W. Peninsula).

19. LEONOTIS, R. Br.

Herbs or shrubs. Flowers large, scarlet or yellow, in axillary densely many-flowered whorls; bracts numerous, slender. Calyx 10-nerved; tube often incurved; mouth oblique, with 8–10 rigid teeth, the upper tooth the largest. Corolla 2-lipped; tube exserted; upper lip long, concave, with a villous crown; lower lip small, 3-lobed, the middle lobe the largest. Stamens 4, didynamous; lower pair longer, ascending; anthers connivent, the cells divaricate. Disk equal. Ovary 4-partite; style subulate, the upper lobe very short. Fruit of 4 oblong or ovoid or obovoid dry angular obtuse or truncate nutlets; basal scar small.—DISTRIB. Species 12, African, one also Indian and American.

1. **Leonotis nepetifolia,** *R. Br. in Ait. Hort. Kew.* ed. 2 (1811) v. 3, p. 409. A tall erect plant 4–6 ft. high; stem stout, obtusely quadrangular with thickened angles, deeply sulcate, finely pubescent. Leaves $2\frac{1}{2}$–6 by $1\frac{1}{2}$–4 in., membranous, ovate, acute, coarsely crenate-serrate, finely pubescent on both sides, base shortly cuneate, running down into the petiole; petioles 1–4 in. long, winged in the upper part. Flowers in axillary dense globose many-flowered whorls $1\frac{1}{2}$–$2\frac{1}{2}$ in. in

diam.; floral leaves lanceolate, deflexed; bracts reaching $\frac{5}{8}$ by $\frac{1}{16}$ in., linear, strongly spinous-pointed, deflexed, pubescent. Calyx $\frac{3}{4}$ in. long, ribbed, tubular, incurved, the lower part puberulous, the upper part densely pubescent or villous and also bristly with long white hairs; tube reticulately veined within, not villous at the oblique mouth; teeth 8–9, unequal, the upper much the largest reaching $\frac{1}{3}$ in. long, ovate, acute, the others triangular, all with strong sharp spinous points. Corolla 1 in. long, orange-scarlet; tube $\frac{1}{2}$ in. long, glabrous below, densely clothed in the upper part with orange-scarlet hairs, annulate inside with 3 transverse parallel rings of white hairs, the 2 upper rings closer together than the middle and lower rings; upper lip $\frac{1}{2}$ in. long, densely woolly with orange-scarlet hairs; lower lip $\frac{1}{6}$–$\frac{1}{5}$ in. long, deeply 3-lobed, the lobes oblong, obtuse, the middle lobe slightly the longest. Nutlets $\frac{1}{6}$ in. long, oblong-obovoid, obliquely truncate and with a deep triangular pit at the apex, the inner face sharply angular, the dorsal face rounded, the margins ribbed. I have examined many specimens but cannot find that the corolla-tube is exserted. Fl. B. I. v. 4, p. 691; Grah. Cat. p. 153; Dalz. & Gibs. p. 212 & Suppl. p. 67; Wight, Icon. t. 867; Trim. Fl. Ceyl. v. 3, p. 387; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 857; Watt, Dict. Econ. Prod. v. 4, p. 625.—Flowers: Sept.–Oct. VERN. *Dipmál*; *Matisul.*

Doubtfully indigenous. Common about villages in the Konkan but never at any distance from the habitations of man, also pretty common in hill forts in the Deccan.—DISTRIB. Throughout hotter India cultivated and naturalized; Ceylon, Tropical Asia, Africa, and America.

The ash of the flower-heads mixed with curds is applied to ringworm.

20. **NEPETA,** Linn.

Erect or prostate herbs. Leaves opposite. Flowers usually blue or white (rarely yellow); whorls axillary or terminal. Calyx tubular, 15-nerved; limb equally 5-toothed, or sub-bilabiate with the 2 lower teeth narrower than the 3 upper. Corolla 2-lipped; tube not annulate within; throat inflated; upper lip straight, notched or 2-fid; lower 3-fid, the middle lobe the largest. Stamens 4, didynamous, the upper pair the longest; anther-cells diverging. Disk uniform or enlarged in front. Ovary 4-partite; style shortly 2-fid; lobes subequal, subulate. Fruit of 4 ovoid or compressed obtuse dry smooth or granulate nutlets; basal scar small or oblique.—DISTRIB. Temperate Europe, N. and S. Africa, Asia; species about 120.

Upper calyx-teeth narrowly triangular, aristate ..... 1. *N. ruderalis.*
Upper calyx-teeth broadly triangular, not aristate ..... 2. *N. bombaiensis.*

1. **Nepeta ruderalis,** *Buch.-Ham. MS. ex Hook. f. Fl. B. I.* v. 4 (1885) p. 661. Annual, 6–18 in. high, branched from the base; branches erect or ascending, obtusely quadrangular, grooved, softly pubescent, often floriferous almost throughout their entire length. Leaves $\frac{1}{2}$–2 by $\frac{3}{8}$–$1\frac{1}{2}$ in., broadly ovate or suborbicular, obtuse, crenate-serrate, green or hoary, base cordate or truncate; petioles $\frac{1}{4}$–$1\frac{1}{4}$ in. long. Flowers pedicellate, in dense axillary many-flowered pedunculate, often 2-branched cymes, the flowers lateral on the cyme-branches; peduncles of lower cymes often 1 in. or more long, those of the upper cymes short; bracts $\frac{1}{5}$–$\frac{1}{4}$ in. long, linear-lanceolate, acute, densely ciliate; pedicels $\frac{1}{20}$ in. long. Calyx in flower $\frac{1}{6}$ in. long, pubescent and glandular,

2-lipped; upper lip $\frac{1}{10}$ in. long with 3 triangular aristate teeth, the middle lobe $\frac{1}{16}$ in. long; lower lip $\frac{1}{16}$ in. long, with 2 subulate teeth. Corolla bluish-purple, pubescent outside, exserted; tube inflated at the throat; upper lip $\frac{1}{16}$ in. long, oblong, 2-fid with obtuse lobes; lower lip $\frac{1}{8}$ in. long, 3-lobed, the middle lobe broad, emarginate, crenulate, much larger than the 2 small rounded lateral ones. Nutlets mucilaginous when moistened, $\frac{1}{20}$–$\frac{1}{16}$ by $\frac{1}{30}$ in., oblong-ellipsoid, with a white V-shaped hilum on the inner face near the base, brown, obscurely granulate with whitish spots which show when wetted. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 857; Watt, Dict. Econ. Prod. v. 5, p. 346.—Flowers: Nov.

KONKAN: *Stocks*!; Bassein, *Ryan*! DECCAN: Purandhar, *Dr. Barnes*!

VAR. *Woodrowii*. Calyx larger, $\frac{1}{4}$ in. long in flower; corolla scarcely exserted; nutlets $\frac{1}{16}$–$\frac{1}{12}$ in. long, narrowly ellipsoid, smooth, brown, with white spots and mucilaginous when wetted.

More abundant than the type in W. India. Sir J. D. Hooker (Fl. B. I. l. c.) mentions that he had received from Mr. Woodrow from Poona a specimen (now in Herb. Kew. n. 476) with the habit of *N. ruderalis* but with a larger calyx and with the nutlets of *N. bombaiensis*.

I have recently received from Mr. Gammie of the College of Science at Poona several specimens collected by Mr. Bhide, the Herbarium-Keeper of that Institution, from the hill fort of Sinhagad (4000 ft.) 12 miles from Poona as well as from Panchgani (4000 ft.) close to Mahableshwar.

The 2 teeth of the lower lip of the calyx seem to be more triangular than those of *N. ruderalis* proper which are subulate.

2. **Nepeta bombaiensis,** *Dalz. in Dalz. & Gibs. Bo. Fl.* (1861) p. 209. Herbaceous, branched, 1 ft. high; stem obtusely quadrangular, clothed with soft white hairs. Leaves $1\frac{1}{2}$–2 by $1\frac{1}{4}$–$1\frac{3}{8}$ in., rounded-ovate, crenate, more or less pubescent on both sides, base cordate or subtruncate; petioles $\frac{1}{2}$–$1\frac{1}{8}$ in. long. Flowers pedicellate, in axillary pedunculate 6–8-flowered cymes; peduncles reaching 1 in. long; pedicels $\frac{1}{8}$–$\frac{3}{8}$ in. long; bracts elliptic-lanceolate, acuminate. Fruiting calyx $\frac{1}{3}$ in. long, pubescent; upper lip longer than the lower, with 3 broadly triangular acute (not aristate) teeth, the middle tooth $\frac{1}{12}$ by $\frac{1}{10}$ in.; lower lip with 3 subulate teeth. Corolla small, pale-blue with purple spots (*Dalzell*). Nutlets $\frac{1}{16}$ in. long, narrowly ellipsoid, dark-brown, smooth, dotted with white dots. Fl. B. I. v. 4, p. 661; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362.—Flowers: July–Aug.

KONKAN: on old walls in Shivnar Fort east of Bombay, *Dalzell*! There is but one scrap of the plant in Herb. Kew. I have seen no others.—DISTRIB. Apparently endemic in the Bombay Presidency.

21. **SALVIA,** Linn.

Herbs, undershrubs, or shrubs of various habit. Flowers small, or large and showy; whorls usually racemose or spicate; bracts small or large, sometimes colored. Calyx tubular or campanulate, 2-lipped; throat naked; upper lip entire or 3-toothed; lower lip 2-fid. Corolla 2-lipped; tube naked or annulate within; upper lip erect; lower 3-lobed, the middle lobe usually broader, entire or emarginate. Perfect stamens 2 (the lower); filaments short, articulate with a slender connective, sometimes produced beyond the joint; connective linear, transverse, the upper arm ascending and bearing a linear fertile cell,

the lower arm straight or deflexed, bearing a fertile or empty cell or naked; upper stamens represented by 2 small staminodes or obsolete. Disk usually enlarged in front. Ovary 4-partite; style shortly 2-fid, the lobes subulate, equal or the lower longer, sometimes flattened. Fruit of 4 ovoid somewhat triquetrous smooth nutlets; basal scar small.—DISTRIB. Cosmopolitan; species 450.

An erect herb; leaves 2–4 in. long; upper lip of calyx entire ... 1. *S. plebeia.*
A low straggling undershrub; leaves less than 2 in. long; upper lip of calyx 3-toothed ... 2. *S. ægyptiaca.*

1. **Salvia plebeia,** *R. Br. Prodr.* (1810) p. 501. An erect herb 6–20 in. high; stems hoary-pubescent, obtusely quadrangular, grooved. Leaves 2–4 by $\frac{3}{4}$–$1\frac{3}{4}$ in., oblong-lanceolate, obtuse or subacute, irregularly crenate, sparsely hairy or nearly glabrous, base usually acute, often decurrent into the petiole; petioles 1–2 in. long. Flowers in paniculate (often somewhat compactly arranged) interrupted pubescent spicate racemes; floral leaves $\frac{1}{10}$ in. long, broadly ovate, subacute, shortly petiolate; bracts small, linear-spathulate. Calyx pedicellate, hairy, $\frac{1}{10}$–$\frac{1}{8}$ in. long in flower, $\frac{1}{6}$–$\frac{1}{5}$ in. long in fruit, 2-lipped; upper lip obtuse, entire, shorter than the lower, reflexed; lower lip 2-fid, the lobes triangular, acute or subacute. Corolla $\frac{1}{6}$ in. long; tube $\frac{1}{8}$ in. long; upper lip oblong, obtuse; lower lip 3-lobed, the middle lobe much larger than the short obtuse lateral ones. Nutlets $\frac{1}{24}$ in. long, ovoid, the inner face slightly angular, the dorsal face rounded, smooth, brown. Fl. B. I. v. 4, p. 655; Dalz. & Gibs. p. 209; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 859; Watt, Dict. Econ. Prod. v. 6, part 2, p. 451.—Flowers: Sept.–Feb.

KONKAN: *Law*!; island of Karanja, *Dalzell & Gibson.* DECCAN: Khandala, *Dalzell & Gibson*; Poona, *Cooke*!, *J. G. Woodrow*!; Kolvan (Máwal taluka), *Bhiva*!; Mahableshwar, in the ravine below the cemetery, *Cooke*! SIND: *Stocks*!—DISTRIB. Throughout India; China, Malay Islands, Australia.

2. **Salvia ægyptiaca,** *Linn. Sp. Pl.* (1753) p. 23. A low much-branched straggling undershrub; branches divaricate, rigid, hairy, quadrangular. Leaves variable, $\frac{1}{4}$–$1\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{3}$ in., subsessile or shortly petiolate, linear-lanceolate, acute, rigid, crenate, much wrinkled, hairy; nerves and veins prominent. Flowers in long racemes; whorls 2–4-flowered, distant; floral leaves small, ovate-lanceolate. Calyx in flower $\frac{1}{8}$–$\frac{1}{6}$ in. long, glandular-hairy, in fruit twice as long, nodding, pedicellate; upper lip with 3 short connivent acute teeth; lower lip with 2 lanceolate acute lobes. Corolla $\frac{1}{5}$ in. long; tube annulate within; upper lip oblong, subquadrate, notched; lower lip 3-lobed, the middle lobe emarginate, larger than the obtuse lateral ones. Nutlets $\frac{1}{12}$ in. long, oblong-ellipsoid, the inner face very slightly angular, the dorsal face rounded, bluish-black, smooth. Fl. B. I. v. 4, p. 656; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Watt, Dict. Econ. Prod. v. 6, part 2, p. 450.

Dalzell without locality in Herb. Kew.! SIND: Boogta hills, *Vicary*!—DISTRIB. India (Panjáb plains, Sind); Afghanistan, W. Asia, N. Africa to the Cape Verde Islands.

VAR. *pumila,* Hook. f. Fl. B. I. v. 4 (1885) p. 656. More scabrid and hispid; leaves very rigid and rugose; calyx villous with long white hairs. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Watt, Dict. Econ. Prod. v. 6, part 2, p. 450.—Flowers: Nov.–Dec. VERN. *Tukam.*

DECCAN: Junnar, *Woodrow*. GUJARAT: Rajkot, *Cooke*!, *Woodrow*! SIND: *Dalzell*, 60!, *Stocks*, 442!; Karachi, *Woodrow*; hills at the Hub near Karachi, *Bhola Puran*!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (Panjáb plains, W. Peninsula); Afghanistan, Beluchistan.

Salvia coccinea, Juss. ex Murr. in Commentat. Gotting. v. 1 (1779) p. 86, t. 1. A slender herb 1–3 ft. high with many quadrangular ascending stems, ovate or cordate acute crenate leaves, and scarlet pedicellate flowers in distant whorls, a native of Central and South America, is often grown in gardens. Dalz. & Gibs. Suppl. p. 67; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 859. *Salvia pseudococcinea*, Grah. Cat. p. 151; Dalz. & Gibs. Suppl. p. 67.

Salvia involucrata, Cav. Icon. v. 2 (1793) p. 3, t. 105. An undershrub 3–4 ft. high or more with ovate acuminate crenate-serrate leaves 2–3 in. long, rosy flowers with a long swollen corolla-tube and subequal lobes, a native of Mexico, is often grown in gardens. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362 & Gard. in Ind. ed. 5, p. 424.

Salvia farinacea, Benth. Lab. Gen. & Sp. (1833) p. 274. Native of Mexico; stems numerous, in a cluster; leaves ovate-lanceolate; calyx densely white-tomentose; corolla violet-blue. A useful bedding plant in Deccan gardens, flowering abundantly from September to May. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362 & Gard. in Ind. ed. 5, p. 423.

Salvia officinalis, Linn. Sp. Pl. (1753) p. 23. *The true Sage*, a native of the South of Europe, is occasionally grown in the gardens of Europeans in the Presidency, but in the Indian climate it is a very delicate plant and its cultivation requires care. The dried leaves are often imported into India from Europe. Grah. Cat. p. 151; Watt, Dict. Econ. Prod. v. 6, part 2, p. 451.

The following not belonging to any of the foregoing genera are more or less cultivated:—

Meriandra bengalensis, Benth. in Bot. Reg. (1829) sub t. 1282 and in Wall. Pl. As. Rar. v. 1 (1830) p. 29. A large straggling shrub, a native of Abyssinia, cultivated throughout India and known as the *Bengal Sage*. The leaves have a strong camphoraceous odor and are employed in native medicine and for preventing the attacks of insects on cloth. Fl. B. I. v. 4, p. 653; Grah. Cat. p. 151; Dalz. & Gibs. Suppl. p. 66; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 362; Prain, Beng. Pl. p. 858; Watt, Dict. Econ. Prod. v. 5, p. 235.—VERN. *Káfurkapát*.

Origanum Majorana, Linn. Sp. Pl. (1753) p. 590. *The Marjoram*. An aromatic herb 1–2 ft. high with ovate-oblong petiolate leaves and purplish or white flowers. A native of S. Europe, N. Africa, and Asia Minor, extensively cultivated in India. Fl. B. I. v. 4, p. 648; Watt, Dict. Econ. Prod. v. 5, p. 493.—VERN. *Murva*.

Thymus Serpyllum, Linn. Sp. Pl. (1753) p. 590. The well-known *Thyme*, a plant with a woody rootstock, small leaves and rose-purple

flowers, occasionally though not very successfully, grown in gardens in the plains. Firminger (Man. Gard. ed. 2, p. 162) says that the plants are with difficulty kept alive through a single hot season. Fl. B. I. v. 4, p. 649; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Watt, Dict. Econ. Prod. v. 6, part 4, p. 48.

Mentha viridis, Linn. Sp. Pl. ed. 2 (1763) p. 804. The common *Green Mint* or *Spearmint*. A well-known herb growing about 2 ft. high with subsessile ovate-lanceolate serrate glabrous leaves and purplish flowers, commonly grown in gardens throughout the plains of India. Fl. B. I. v. 4, p. 647; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Watt, Dict. Econ. Prod. v. 5, p. 231.—VERN. *Pudina.*

Mentha arvensis, Linn. Sp. Pl. (1753) p. 577. *The Marsh Mint.* A herb of the W. Himalaya, very common in Indian gardens, with ovate acute serrate leaves. Fl. B. I. v. 4, p. 648; Grah. Cat. p. 151; Dalz. & Gibs. Suppl. p. 68; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Watt, Dict. Econ. Prod. v. 5, p. 228.—VERN. *Pudina.*

Mentha piperita, Linn. Sp. Pl. (1753) p. 576. *Peppermint.* A herb 1–2 ft. high with a reddish branched stem, ovate-oblong petiolate leaves, and purple flowers in short obtuse loose spikes, grown sometimes in gardens. Fl. B. I. v. 4, p. 647; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Watt, Dict. Econ. Prod. v. 5, p. 229.

Hyptis suāveolens, Poit. in Ann. Mus. Par. v. 7 (1806) p. 472, t. 29, fig. 2. A rigid erect annual 2–3 ft. high, a native of Tropical America and the W. Indies, with petiolate ovate (or the lower cordate) serrate leaves and blue flowers, is grown in gardens or sometimes found as an escape. Fl. B. I. v. 4, p. 630; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 361; Prain, Beng. Pl. p. 848.

ORDER XCIX. PLANTAGINACEÆ.

Scapigerous annual or perennial herbs. Leaves usually radical. Scapes axillary. Flowers small, greenish, spicate, often dimorphic, bracteate. Sepals 4, imbricate in bud, persistent. Corolla scarious, hypogynous; lobes 4, short, imbricate in bud. Stamens 4, inserted on the corolla-tube; filaments filiform, persistent; anthers large, pendulous, versatile. Ovary superior, 1–4-celled; ovules 1–8 in each cell. Capsule 1–4-celled, circumscissilely dehiscent, membranous, 1- or more-seeded. Seed usually attached by the centre; testa thin, mucilaginous; albumen fleshy; embryo cylindric, transverse; radicle inferior.—DISTRIB. Genera 3; species scarcely 100.

1. PLANTAGO, Linn.

Characters of the Order.

Corolla-lobes glabrous.
Cells of capsule 4–8-seeded ..... 1. *P. major.*
Cells of capsule 1–2-seeded.
Corolla-lobes acute.
Leaves usually 3-nerved, shortly petiolate; bracts acute, shorter than the calyx..... 2. *P. Stocksii.*

Leaves 5-nerved, sheathing at the base; bracts obtuse, as long as or longer than the calyx	3. *P. amplexicaulis.*
Corolla-lobes obtuse	4. *P. ovata.*
Corolla-lobes hirsute; leaves oblanceolate	5. *P. ciliata.*

1. **Plantago major,** *Linn. Sp. Pl.* (1753) p. 112. A perennial herb with an erect stout rootstock. Leaves alternate, radical, 1–5 in. long, of variable width, ovate or ovate-oblong, obtuse or subacute, entire or toothed, nearly glabrous, base tapering and decurrent into the petiole 3–7 (commonly 5)-nerved; petioles usually longer than the leaf-blade, broad, sheathing at the base. Flowers scattered or crowded in long slender rather lax spikes 2–6 in. long; bracts $\frac{1}{16}$–$\frac{1}{12}$ in. long, shorter than the calyx, broadly ovate-oblong, obtuse, with scarious margins. Calyx $\frac{1}{8}$ in. long, glabrous; sepals oblong, obtuse or subacute, obtusely keeled on the back and with broad scarious margins. Corolla $\frac{1}{6}$ in. long, glabrous; lobes lanceolate, acute, reflexed. Capsules ovoid, $\frac{1}{8}$–$\frac{1}{6}$ in. long, glabrous, dehiscing circumscissilely a little above the base, the top coming off as a conical lid tipped with the remains of the style. Seeds 4–8, angled, rugulose, dull-black, $\frac{1}{30}$ in. long. Fl. B. I. v. 4, p. 705; Trim. Fl. Ceyl. v. 3, p. 389; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Watt, Dict. Econ. Prod. v. 6, part 1, p. 285.—Flowers: Sept.–Feb. VERN. *Bártang.*

Rare. KONKAN: Bombay, *Stocks!* DECCAN: Mahableshwar along the banks of the Yenna River, *Cooke!*, *H. M. Birdwood*; Poona, *Woodrow!*—DISTRIB. India (temperate and alpine Himalaya, Assam, Birma, W. Peninsula); Ceylon, Malaya, Afghanistan, and westwards to the Atlantic; wild or introduced in these and many other countries.

The seeds are used in Indian medicine, having the same properties ascribed to them as to those of *P. ovata.* They are largely imported from Persia. See Watt, Dict. Econ. Prod. l. c.

2. **Plantago Stocksii,** *Boiss. in DC. Prodr.* v. 13, part 1 (1852) p. 720. Annual or perennial, cobwebby or subsilky with white hairs. Leaves 1½–4 by $\frac{3}{8}$–$\frac{7}{8}$ in., shortly petiolate, lanceolate, long-acuminate, entire, usually 3 (rarely 5)-nerved, tapering at the base into a short often obscure petiole. Flowers on slender scapes which are longer than the leaves; spikes short and few-flowered, or long with many distant flowers; bracts $\frac{1}{8}$ in. long, broadly ovate, acute, with broad scarious margins. Calyx $\frac{1}{6}$ in. long, glabrous; sepals ovate-oblong, obtuse, with broad scarious margins. Corolla-lobes nearly $\frac{1}{10}$ in. long, narrowly ovate-lanceolate, very acute, reflexed. Capsules $\frac{1}{4}$ in. long, 2-seeded, ovoid, subobtuse, tipped with the style-base, smooth, brown, the top coming off as a conical lid. Seeds $\frac{1}{6}$ in. long, 1 in each cell, oblong, boat-shaped, black. Fl. B. I. v. 4, p. 706; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363. *Plantago remotiflora*, Stocks, in Kew Journ. Bot. v. 4 (1852) p. 179.—Flowers: Mar.

Rare. *Dalzell* without locality in Herb. Kew. SIND: Kirthár Mountains, *Sir E. James* ex *Woodrow.*—DISTRIB. N.W. India, Beluchistan, Afghanistan.

3. **Plantago amplexicaulis,** *Cav. Icon.* v. 2 (1793) p. 22, t. 125. Annual or perennial, more or less hairy, stemless or with a short stem, often branched above. Leaves 3–6 by ½ in., narrowly lanceolate, acuminate, 5-nerved, narrowed and sheathing at the base, entire or very distantly toothed. Scapes numerous, axillary, terete, glabrous, usually

exceeding the leaves. Flowers in ovoid spikes ½–1½ in. long; bracts ⅕ in. long, cucullate, broadly ovate-oblong, obtuse, membranous except the green midrib. Calyx ⅙–⅕ in. long; sepals ovate-oblong, subacute, all membranous except the midrib which in the inner sepals is very narrow, sometimes almost 0. Corolla glabrous; tube ⅛ in. long; lobes ⅛ by $\frac{1}{16}$ in., ovate, acute, concave. Capsules ⅕ in. long, 2-seeded, ovoid, subobtuse, pale-brown, smooth, the top coming off as a conical lid. Seeds ⅙ in. long, oblong, boat-shaped, nearly black. Fl. B. I. v. 4, p. 706; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Watt, Dict. Econ. Prod. v. 6, part 1, p. 284.—VERN. *Gajpipali.*

Rare. SIND: Boogta hills, *Vicary*!—DISTRIB. India (Panjáb plains, Malwa); westwards to Egypt and Greece.

4. **Plantago ovata,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 31. A stemless or nearly stemless softly hairy or woolly annual. Leaves 3–9 in. long, scarcely reaching ¼ in. broad, narrowly linear or filiform, finely acuminate, entire or distantly toothed, attenuated at the base, usually 3-nerved. Scapes longer or shorter than the leaves, glabrous or pubescent. Flowers in ovoid or cylindric spikes ½–1½ in. long; bracts ⅛ in. long and about as broad as long, broadly ovate or suborbicular, concave, membranous except the narrow midrib, glabrous. Calyx ⅛ in. long, usually glabrous; sepals elliptic, obtuse, concave, scarious except the midrib which is as broad (or nearly so) in the inner as in the outer sepals. Corolla-lobes rounded, ⅛ in. long, concave, obtuse, apiculate, glabrous. Capsules ⅓ in. long, ellipsoid, obtuse, the upper half coming off as a blunt conical lid, membranous, glabrous. Seeds ⅛ in. long, ovoid-oblong, boat-shaped, smooth, yellowish-brown. Fl. B. I. v. 4, p. 707; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Watt, Dict. Econ. Prod. v. 6, part 1, p. 285. *Plantago Ispaghula,* Roxb. Fl. Ind. v. 1 (1832) p. 404.—VERN. *Ispaghul.*

Doubtfully indigenous in SIND. Stocks says it occurs in gardens near Karachi.—DISTRIB. India (Panjáb plains and low hills from the Sutlej westwards; in other parts cultivated); westwards to Spain and the Canary Islands. Under the name *Ispaghul* or *Spogel,* the seeds are largely imported into Bombay from Persia, and valuable medicinal properties are ascribed to them. They form with boiling water a rich tasteless mucilage which is employed as a remedy for diarrhœa and dysentery and generally as a demulcent. See Watt, Dict. Econ. Prod. l. c.

5. **Plantago ciliata,** *Desf. Fl. Atlant.* v. 1 (1798) p. 137, t. 39. Annual or perennial, often dwarf, stemless or very shortly caulescent, densely silky or woolly. Leaves 1–4 by ⅕–⅓ in., usually oblanceolate, mucronate, densely silky or villous, entire or slightly and irregularly toothed, base tapering into a long or short petiole which is often obscure owing to the decurrence of the leaf-blade. Scapes stout, numerous, softly woolly, shorter or longer than the leaves. Flowers in ovoid or cylindric spikes ½–1¾ in. long; bracts ⅙–⅕ in. long, ovate-oblong, obtuse, hairy and ciliate with long slender hairs, membranous except the green midrib. Calyx ⅛ in. long; sepals oblong-obovate, membranous, with a green midrib (that of the inner sepals very narrow), hairy on the back with long slender hairs. Corolla-tube ⅛ in. long, glabrous; lobes $\frac{1}{10}$ in. long, ovate-lanceolate, acuminate, finely pointed, silky-hairy on the back. Capsules subglobose, ⅛ in. long, 2-seeded, the top coming off as a subhemispherical lid. Seeds $\frac{1}{10}$ in. long, broadly ovoid, boat-shaped, with

membranous margins, smooth. Fl. B. I. v. 4, p. 707; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363.

SIND: Kirthár Mountains, *Sir E. James* ex *Woodrow*.—DISTRIB. India (Panjáb hills); westwards to Arabia and Egypt.

ORDER C. NYCTAGINACEÆ.

Herbs, shrubs or trees. Leaves usually opposite, entire; stipules 0. Flowers hermaphrodite (rarely unisexual), regular, sometimes dimorphous; inflorescence various; bracts often involucrate, free or connate. Perianth monosepalous, usually small, petaloid; tube persistent, enveloping the fruit; limb 3–5-lobed, persistent or deciduous, the lobes plicate in bud. Stamens 1–30, hypogynous, sometimes unilateral; filaments small, unequal, inflexed in bud; anthers included or exserted, dorsifixed, didymous. Ovary 1-celled, free; ovule solitary, basal, erect; style filiform, involute in bud; stigma small, simple or multifid. Fruit membranous, indehiscent, enclosed in the coriaceous perianth-tube. Seed erect; testa adherent; albumen soft or floury; embryo straight with convolute cotyledons or incurved; radicle inferior.—DISTRIB. Genera 22; species about 220 in tropical and warm regions.

Embryo hooked; radicle long; limb of perianth plicate	1. BOERHAAVIA.
Embryo straight; radicle short; limb of perianth induplicato-valvate	2. PISONIA.

1. BOERHAAVIA, Linn.

Erect or diffuse often divaricately branched herbs. Leaves opposite, often in unequal pairs. Flowers small, paniculate, umbellate or subcapitate, articulated with the pedicel; bracteoles small, often deciduous, rarely whorled and involucrate. Perianth-tube long or short, ovoid below, narrowed above the ovary; limb funnel-shaped with 5-lobed margin, the lobes plicate. Stamens 1 or 2–5, connate below, exserted; filaments capillary, unequal. Ovary oblique, stipitate; ovule erect; stigma peltate. Fruit enclosed in the ovoid, turbinate or clavate, obtuse or truncate perianth-tube, round, 5-ribbed or 5-angled, viscidly glandular. Seeds with adherent testa; embryo hooked; cotyledons thin, broad, the outer the larger, enclosing a soft scanty albumen.—DISTRIB. Tropical and Subtropical; species about 30.

Herbaceous, diffuse or subscandent.	
Fruit glandular along the ribs not at the crown.	
Flowers pink or purple, in small umbels, sessile or with very short pedicels; opposite pairs of leaves very unequal, obtuse	1. *B. diffusa.*
Flowers pink, in umbels with pedicels $\frac{1}{2}$–$\frac{3}{4}$ in. long; opposite pairs of leaves nearly equal, acute	2. *B. repanda.*
Fruit with large glands at the crown; flowers in whorls, white; leaves obtuse	3. *B. verticillata.*
Shrubby, erect.	
Leaves ovate, acute, petiolate; stem and branches stout, densely clothed with viscid glandular hairs; fruit glandular along the ribs	4. *B. fruticosa.*
Leaves linear-oblong, obtuse, sessile; stem and branches slender, glabrous; fruit not glandular along the ribs	5. *B. elegans.*

1. **Boerhaavia diffusa,** *Linn. Sp. Pl.* (1753) p. 3. Herbaceous, diffuse; root large, fusiform; stems prostrate or ascending, reaching 2–3 ft. long, divaricately branched, slender, cylindric, thickened at the nodes, minutely pubescent or nearly glabrous, often purplish. Leaves at each node in unequal pairs, the larger 1–1½ in., the smaller ½–¾ in. long, both nearly as broad as long, broadly ovate or suborbicular, rounded at the apex, green and glabrous above, usually white with minute scales beneath, the margins entire, often colored pink, somewhat undulate, base rounded or subcordate; petioles nearly as long as the blade, slender. Flowers very small, shortly stalked or nearly sessile, 4–10 together, in small umbels arranged in slender long-stalked corymbose, axillary and terminal panicles; bracteoles small, lanceolate, acute. Perianth ⅛ in. long; ovarial part of tube $\frac{1}{20}$ in. long, contracted above the ovary, glandular-viscid; limb funnel-shaped, dark-pink, with 5 narrow vertical bands outside. Stamens 2 or 3, slightly exserted. Fruit ⅛ in. long, clavate, rounded, broadly and bluntly 5-ribbed, very glandular. Dalz. & Gibs. p. 213; Trim. Fl. Ceyl. v. 3, p. 390; Watt, Dict. Econ. Prod. v. 1, p. 485. *Boerhaavia repens*, Linn. Sp. Pl. (1753) p. 3; Hook. f. Fl. B. I. v. 4, p. 709; Dalz. & Gibs. p. 213; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 862. *B. repens*, vars. *diffusa* & *procumbens*, Hook. f. Fl. B. I. v. 4, p. 709. *B. procumbens*, Roxb. Fl. Ind. v. 1, p. 146; Grah. Cat. p. 167; Wight, Icon. t. 874.—Flowers: Nov. VERN. *Vasu*; *Ghetuli*.

A troublesome weed, very abundant throughout the Presidency especially in the Deccan and Gujarat. It is a Protean plant changing its appearance according to soil and situation.—DISTRIB. Throughout India; Ceylon; Tropical and Subtropical Asia, Africa and America.

The leaves are eaten as a pot-herb and the root is employed in medicine. See Watt, Dict. Econ. Prod. l. c.

2. **Boerhaavia repanda,** *Willd. Sp. Pl.* v. 1 (1797) p. 22. A diffuse subscandent glabrous or pubescent herb; branches 3–6 ft. long, with long internodes, cylindric, glabrous or nearly so. Leaves 1½–2¾ by 1¼–2 in., deltoid-ovate, acute or acuminate, repand-sinuate, glabrous above, pubescent beneath, the opposite nearly equal, base usually cordate or truncate; petioles ⅝–1¼ in. long, slender. Flowers in 3–8-flowered umbels on long slender peduncles 1–2¼ in. long; bracteoles beneath the umbels $\frac{1}{10}$–$\frac{1}{6}$ in. long, lanceolate, acute; pedicels ½–¾ in. long, very slender. Perianth pink, rather less than ½ in. long; ovarial part of the tube ⅛ in. long, the petaloid portion narrow below; lobes of the limb emarginate. Stamens 4 or 5, much exserted. Fruit ¼ in. long, clavate, faintly ribbed, rough with glandular knobs. Fl. B. I. v. 4, p. 709; Dalz. & Gibs. p. 213; Wight, Icon. t. 1766; Trim. Fl. Ceyl. v. 3, p. 390; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 862.—Flowers: Oct.–Dec. or more or less throughout the year. VERN. *Punarnavá*; *Pungali*.

KONKAN: *Stocks*! DECCAN: *Woodrow*; Dongergaon near Ahmednagar, *Cooke*! GUJARAT: in hedges at Surat, *Dalzell & Gibson*.—DISTRIB. Throughout India; Ceylon, Beluchistan.

3. **Boerhaavia verticillata,** *Poir. Encyc. Méthod.* v. 5 (1804) p. 56. Decumbent or climbing among bushes; branches long, pale, terete, glabrous. Leaves thick, 1½–2¼ in. long, nearly as broad or sometimes

broader than long, broadly ovate or suborbicular (rarely oblong), obtuse, mucronate, usually glabrous with sinuate margins, base usually cordate; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long, stout. Flowers in long-pedunculate racemes arranged in few-flowered distant whorls along a slender rhachis; bracteoles small, ovate-oblong, acute, deciduous; pedicels very variable in length, $\frac{1}{4}$–$\frac{3}{4}$ in. long, slender. Perianth $\frac{1}{3}$ in. long, usually white; ovarial part of tube $\frac{1}{12}$ in. long, much narrowed above the ovule, the petaloid portion funnel-shaped; lobes of the limb 2-fid. Stamens not much exserted. Fruit $\frac{1}{6}$ in. long, clavate, furnished with large semi-globose glands round the crown. Fl. B. I. v. 4, p. 710; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363. *Boerhaavia stellata*, Wight, Icon. t. 875; Dalz. & Gibs. p. 213. *B. scandens*, Grah. Cat. p. 167 (*not* of Linn.).—Flowers: Aug.–Dec. VERN. *Sátura.*

Stocks without locality in Herb. Kew.!; *Dalzell* without locality in Herb. Kew.! KONKAN: *Woodrow*! DECCAN: *Woodrow*; Deccan hills, *Woodrow*, 8!; Dhavaleshvar hill near Rájvádi Railway Station, S. M. Railway, *Kanitkar*! GUJARAT: Kathiawar, *Woodrow, Dalzell & Gibson.* SIND: *Dalzell*, 75!, *Stocks*, 51!—DISTRIB. India (Panjáb, W. Peninsula); Afghanistan, Beluchistan, and westward to Syria and Tropical Africa.

4. **Boerhaavia fruticosa,** *Dalz. in Dalz. & Gibs. Bo. Fl.* (1861) p. 213. Shrubby, erect, the whole plant clothed with viscid glandular hairs; stem near the base 1½ in. in diam. or more; branches stout, terete. Leaves 1¼–2 by $\frac{5}{8}$–1½ in., ovate or deltoid-ovate, acuminate, glandular-hairy on both sides, base usually truncate; petioles ¼–$\frac{5}{8}$ in. long, stout, glandular-hairy. Flowers in umbels which are usually solitary on the top of the peduncle, but sometimes superposed; peduncles ½–1¾ in. long, stout, glandular-hairy; bracteoles $\frac{1}{5}$ in. long, linear-lanceolate, acute; pedicels ¼–⅜ in. long, 6–8 in an umbel, stout, glandular-hairy. Perianth rather more than $\frac{3}{8}$ in. long, *pink*; ovarial portion of the tube $\frac{1}{10}$ in. long. Stamens 3 (*Dalzell*), much exserted. Fruit $\frac{1}{8}$ in. long, clavate, ribbed, furnished with a row of glands along the ribs.

Dalzell in his description (*l. c.*) describes the pedicels as nearly as long as the peduncle, which is an error. Fl. B. I. v. 4, p. 710; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363.

Rare. KONKAN: *Stocks*! Shivnar Fort and Ghâts to the east of Bombay, *Dalzell & Gibson.* Sir J. Hooker (Fl. B. I. l. c.) is of opinion that this is probably an African species.

5. **Boerhaavia elegans,** *Choisy, in DC. Prodr.* v. 13, part 2 (1849) p. 453. Shrubby below; rootstock woody, much divided; branches erect, 1–2 ft. long, glabrous, twiggy, terete. Leaves subsessile, curiously mottled with white when dry, 1–1¾ by ⅕–⅜ in., linear-oblong or oblong-lanceolate, obtuse, often mucronulate, fleshy, rugose and canescent beneath; petioles 0–⅛ in. long. Flowers in very large lax much-branched trichotomous glabrous leafless panicles, sometimes reaching 10 by 8 in.; branches of the panicle slender; bracts at the forks $\frac{1}{16}$ in long, lanceolate, acute; bracteoles beneath the flowers (when present) about $\frac{1}{25}$ in. long, lanceolate, acute, deciduous; pedicels ¾–1½ in. long, very slender. Fruit ⅛–$\frac{1}{6}$ in. long, clavate, with 5 obtuse strong quite glabrous ribs, minutely hairy between the ribs. Fl. B. I. v. 4, p. 710; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363.

In the Bombay Presidency confined to Sind. SIND: *Stocks*, 814!—DISTRIB. India (Panjáb); Beluchistan, S. Arabia.

2. **PISONIA,** Linn.

• Trees or shrubs unarmed or with axillary spines. Leaves opposite or alternate, entire. Flowers small, usually dicœcious, in paniculate subsessile or pedunculate cymes; bracteoles 2-3, not involucrate. MALE FLOWERS: Perianth campanulate; limb 5-lobed or 5-toothed, the segments induplicato-valvate. Stamens 6–10, exserted; filaments connate below into a tube or ring; anthers oblong or didymous. FEMALE FLOWERS: Perianth tubular, usually enlarged at the base. Ovary elongate, ovoid, sessile; ovule solitary; style included or exserted; stigma capitellate, peltate or lacerate. Fruit cylindric, compressed, or 5-angled, with 5 viscid ribs or with rows of viscid stipitate glands; utricle elongate, membranous. Seed with a hyaline testa adnate to the pericarp; embryo straight; albumen scanty, soft; radicle inferior.—DISTIB. Species 60, all tropical.

1. **Pisonia aculeata,** *Linn. Sp. Pl.* (1753) p. 1026. A large scandent shrub with many curved axillary nearly opposite sharp stout spines; trunk reaching 6 in. in diam.; branches numerous, subopposite, terete, slightly striate, finely pubescent or nearly glabrous. Leaves 1-3 by $\frac{1}{2}$–$1\frac{1}{2}$ in., elliptic or elliptic-lanceolate, obtuse, entire, glabrous or nearly so, base tapering; petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long. Flowers in small dense cymose pubescent clusters, combined into small pedunculate axillary panicles; bracts and bracteoles scarcely $\frac{1}{20}$ in. long, ovate-oblong, obtuse, hairy; pedicels short, pubescent, the fruiting pedicels much elongated. MALE FLOWERS: Perianth campanulate, $\frac{1}{10}$ in. long, pubescent outside, and with 5 deep triangular acute teeth. Stamens 6-10, much exserted. FEMALE FLOWERS: Perianth tubular, $\frac{1}{10}$ in. long, shortly 5-toothed; style rather stout; stigma lacerate. Fruit oblong or clavate, with long pedicels, 5-ribbed, pubescent between the ribs, each rib muricate with 1 or 2 vertical rows of stalked viscous glands. Fl. B. I. v. 4, p. 711; Grah. Cat. p. 167; Wight, Icon. tt. 1763-1764; Trim. Fl. Ceyl. v. 3, p. 391; Talb. Trees, Bomb. ed. 2, p. 275; Watt, Dict. Econ. Prod. v. 6, part 1, p. 268.—Flowers: Jan.–Mar.

Rare. *Dalzell* without locality in Herb. Kew.! KONKAN: *Law*! KANARA: near Bunwasi (Sirsi subdivision of N. Kanara), *Talbot*—DISTRIB. India (coast forests of Birma, the Andaman Islands, W. Peninsula); Ceylon, Tropical Asia, Africa, Australia, and America.

Pisonia morindifolia, R. Br. in Wall. Cat. (1828) 7130. A large branched unarmed shrub or small tree, found sparingly in the Andamans and the Malay Islands, known to Anglo-Indians as the *Lettuce Tree.* Leaves lettuce-green, the young ones almost white. Grown in tubs about bungalows in Bombay. The leaves of the male plant are of a darker green than those of the female, which latter is therefore the more commonly cultivated. Dalz. & Gibs. Suppl. p. 72; Wight, Icon. v. 5, part 2, p. 1, t. 1765 (name in the plate curiously misspelt); Trim. Fl. Ceyl. v. 3, p. 392; Woodr. Gard. in Ind. ed. 5, p. 425. *Pisonia alba,* Spanog. in Linnæa, v. 15 (1841) p. 342; Hook. f. Fl. B. I. v. 4, p. 711; Talb. Trees, Bomb. ed. 2, p. 276; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Watt, Dict. Econ. Prod. v. 6, part 1, p. 268.—VERN. *Chinai-salit.*

The following not belonging to either of the foregoing genera, all natives of Tropical America, are commonly grown in gardens:—

Mirabilis Jalapa, Linn. Sp. Pl. (1753) p. 177. *The Marvel of Peru.* A large herbaceous plant grown in gardens throughout India and often found as an escape. It is continually in bloom with *Ipomœa*-like flowers, some dark crimson, some yellow or white, and some crimson striped with white or yellow. Grah. Cat. p. 167; Dalz. & Gibs. Suppl. p. 72; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 862; Watt, Dict. Econ. Prod. v. 5, p. 253.—Flowers: Aug.–Dec. VERN. *Gul-abbas.*

Bougainvillæa spectabilis, Willd. Sp. Pl. v. 2 (1799) p. 348 (*Buginvillæa*). A large thorny extensively climbing shrub, a native of Brazil, with pubescent branches and leaves, bearing in the hot season a profusion of small pale yellow flowers supported by large purple or magenta-colored bracts which render the plant a most conspicuous object, a perfect blaze of color in the hot weather. The plant was introduced from Bengal by Sir E. Perry and is now common in gardens as a covering to trellises, archways, and the like. Dalz. & Gibs. Suppl. p. 72; Woodr. Gard. in Ind. ed. 5, p. 424; Prain, Beng. Pl. p. 863.

A variety (*lateritia*) with brick-red bracts is sometimes grown.

Bougainvillæa glabra, Choisy, in DC. Prodr. v. 13, part 2 (1849) p. 437. A plant a native of Brazil, very like the former but of more weakly growth, with glabrous branches and leaves, and almost, if not entirely, free from spines. Flowers more or less throughout the year, while *B. spectabilis* only flowers in the hot season. Woodr. Gard. in Ind. ed. 5, p. 424; Prain, Beng. Pl. p. 863.

ORDER CI. ILLECEBRACEÆ.

Annual or perennial herbs. Leaves usually opposite; stipules scarious. Flowers minute, usually hermaphrodite, cymose, often with scarious bracts. Perianth herbaceous or coriaceous, persistent and often indurated after flowering, 4–5-lobed or 4–5-partite. Petals 0. Stamens as many as the segments of the perianth (rarely fewer or more) and opposite to them, perigynous (rarely hypogynous); filaments short; anthers didymous. Ovary free, 1-celled; ovule solitary in each cell, erect, or pendulous from a basal funicle; style 2–3-fid. Utricle enclosed in the perianth. Seed globose, lenticular or reniform; testa smooth; albumen floury; embryo straight, curved or annular; cotyledons oblong; radicle inferior.—DISTRIB. Genera 17; species about 70 in most warm dry regions.

1. COMETES, Linn.

Low annular branched herbs. Leaves opposite, sessile or narrowed into a short petiole, mucronate, entire; stipules minute, setaceous. Flowers 3 together, the central flower only perfect, surrounded by ferruginous feathery many-partite at length elongate and squarrose bracts. Perianth herbaceous, 5-partite; segments erect, linear-oblong, awned at the back below the apex. Stamens 5, perigynous, alternating and united with 5 membranous staminodes forming a cup below;

anthers didymous. Ovary ovoid-lanceolate, attenuated into a filiform curved style with 3 minute stigmas; ovule erect. Utricle enclosed in the perianth, obovoid. Seed obovoid, erect; testa membranous, with a large lateral chalaza; embryo large, on one side of scanty albumen; cotyledons oblong, plano-convex; radicle inferior.—DISTRIB. N. Africa and Orient (chiefly W. India); species 2.

1. **Cometes surattensis,** *Burm. Fl. Ind.* (1768) p. 39, t. 15, fig. 5. A low herb 4–10 in. high, much-branched from near the base, woody below; branches numerous, erect, terete, pale, glabrous or the young ones slightly pubescent. Leaves ½–1 by ⅛–½ in., elliptic, acute, mucronate, glabrous, base acute, decurrent into a short often obscure petiole $\frac{1}{10}$–¼ in. long. Flowers 3 together in heads ½–¾ in. in diam. (including the bracts), surrounded by numerous pinnatipartite feathery yellowish-red bracts whose ultimate segments are needle-like, which close and interlace over the fruit preventing the escape of the seed and causing it to germinate in the head. Stamens longer than the staminodes. Fl. B. I. v. 4, p. 712; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363.—Flowers: Nov.–Jan.

Rare; in the Bombay Presidency confined to Sind. SIND: *Stocks*, 500!; *Dalzell*, 72!; hills at the Hub near Karachi, *Bhola Puran*!—DISTRIB. Beluchistan, Wazaristan, and westwards to S. Arabia.

The specific name of the plant is a misnomer as it is not found at Surat.

ORDER CII. AMARANTACEÆ.

Herbs (rarely shrubs), erect or with climbing branches. Leaves opposite or alternate; stipules 0. Flowers usually hermaphrodite (rarely polygamous or dicœcious), small, usually in terminal simple or paniculate spikes, cymes or clusters (the outer flowers of a cluster sometimes deformed); bracts hyaline or scarious, never leafy; bracteoles 2, scarious. Perianth usually of 5 free or slightly connate hyaline or scarious persistent sepals, imbricate in bud. Stamens 1–5, opposite the sepals, usually included; filaments usually connate below or united with intervening membranous staminodes in a hypogynous cup; anthers 1- or 2-celled. Ovary 1-celled, ovoid, ellipsoid or globose; ovules 1 or more, amphitropous, erect or suspended from short or long free basal funicles; style sometimes simple or obsolete with capitellate or small stigma, sometimes 2–3-fid with acute stigmas; or styles 2 or 3 papillosely stigmatic on the lower face, erect or recurved. Fruit a membranous utricle, rarely a circumscissilely or irregularly rupturing capsule, very rarely a berry, inclosed in or supported by the persistent perianth. Seed inverted or erect, orbicular, ovate or reniform, compressed; testa crustaceous; embryo horseshoe-shaped or annular, surrounding a floury albumen.—DISTRIB. Genera 48; species about 500, tropical and subtropical.

Leaves alternate; staminodes 0.
- Ovary 2–many-ovulate ..... 1. CELOSIA.
- Ovary 1-ovulate.
  - Ovules erect.
    - Flowers 2-sexual.
      - Flowers capitate; fruit a circumscissile capsule; seed arillate ..... 2. ALLMANIA.

Flowers spicate; fruit a crustaceous nut; seed not arillate ..... 3. DIGERA.
Flowers 1-sexual ..... 4. AMARANTUS.
Leaves alternate or fascicled or with opposite and alternate mixed (never all opposite); stamens with interposed staminodes; ovules suspended from a basal funicle ..... 5. ÆRUA.
Leaves all opposite, not fascicled; ovary 1-celled; ovules suspended from a basal funicle.
Anthers 2-celled.
Flowers all perfect, spicate.
Staminodes 0.
Stamens 5 ..... 6. PSILOSTACHYS.
Stamens 2 ..... 7. NOTHOSÆRUA.
Stamens with interposed staminodes; bracts and bracteoles hard, spinous ..... 8. ACHYRANTHES.
Flowers clustered, 1-3 perfect surrounded by deformed ones.
Stamens with interposed staminodes ..... 9. CYATHULA.
Staminodes 0 ..... 10. PUPALIA.
Anthers 1-celled ..... 11. ALTERNANTHERA.

1. CELOSIA, Linn.

Herbs usually annual. Leaves alternate. Flowers hermaphrodite, in dense terminal and axillary spikes, sessile or shortly pedicellate, white or colored; bracts scarious; bracteoles 2, scarious. Perianth of 5 segments slightly connate below, scarious, oblong or lanceolate, acute or obtuse, striate, erect in fruit. Stamens 5; filaments connate below in a membranous hypogynous cup; anthers 2-celled; staminodes 0. Ovary 1-celled, ovoid or subglobose; ovules 2 or more, on long funicles; style 0 or short or long, sometimes elongating in fruit; stigmas simple or 2 or 3, subulate. Fruit a circumscissilely dehiscent capsule membranous or sometimes corky or coriaceous. Seeds 2 or more, erect, lenticular; testa crustaceous, black, shining or dull; embryo annular, surrounding floury albumen; cotyledons linear; radicle descending or ascending.—DISTRIB. Tropical Asia, Africa and America; species 35.

Flowers in dense spikes 1–6 in. long ..... 1. *C. argentea.*
Flowers in distant small clusters on a spicate inflorescence.
Leaves more than 1 in. long, narrowly ovate; branches, rhachis of the spike, and petioles glabrous ..... 2. *C. pulchella.*
Leaves less than 1 in. long, broadly ovate; branches, rhachis of the spike, and petioles hairy ..... 3. *C. polygonoides.*

1. **Celosia argentea,** *Linn. Sp. Pl.* (1753) p. 205. Annual, 1–3 ft. high, glabrous; stem erect, simple or ascending; branches grooved. Leaves variable, 1–4 by $\frac{1}{4}$–$1\frac{1}{4}$ in., linear or linear-lanceolate (rarely ovate), acute, entire, glabrous, base much tapering into a short petiole or leaves sessile. Flowers at first pinkish, afterwards glistening white, crowded and imbricate, in close cylindric blunt or acuminate terminal spikes 1–6 by $\frac{3}{4}$–1 in., sometimes branching at the apex in a cock's-comb form; bracteoles $\frac{1}{6}$–$\frac{1}{5}$ in. long, linear-lanceolate, scarious. Perianth $\frac{1}{3}$ in. long or more; sepals linear-lanceolate, acute, scarious, with 3 close parallel slender striæ on the back. Stamens short; filaments connate into a cup. Style filiform, elongate after flowering, sometimes exserted in fruit. Capsules $\frac{1}{8}$–$\frac{1}{6}$ in. long, ellipsoid, tapering at the apex into the style, circumscissile about the middle. Seeds 4–8, subreniform,

compressed, $\frac{1}{16}$ in. in diam., black, polished, shining. Fl. B. I. v. 4, p. 714; Grah. Cat. p. 167; Dalz. & Gibs. p. 215; Wight, Icon. t. 1767; Trim. Fl. Ceyl. v. 3, p. 393; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 867; Watt, Dict. Econ. Prod. v. 2, p. 240.—Flowers: Oct.-Dec. VERN. *Kurdu.*

A very variable plant (doubtfully indigenous, although its native country is uncertain) which assumes very different appearances according to the soil or situation in which it may be found (*Graham*). Common everywhere in fields at the close of the rains in the Bombay Presidency and also throughout India, Ceylon, Tropical Asia, Africa and America, cultivated or introduced.

2. **Celosia pulchella,** *Moq. in DC. Prodr.* v. 13, part 2 (1849) p. 238. Slender, diffusely branched, 1–3 ft. high, glabrous; stem more or less woody below. Leaves $1\frac{1}{2}$–$2\frac{1}{2}$ by $\frac{3}{4}$–$1\frac{1}{4}$ in., ovate, acute, apiculate, entire, glabrous, base rounded, shortly cuneate; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long, glabrous. Flowers small, 2 or 3 together in distant clusters, in elongate simple slender glabrous terminal spikes; bracteoles $\frac{1}{16}$ in. long, ovate-lanceolate, acute, scarious. Perianth $\frac{1}{16}$ in. long, white; sepals ovate, acute, scarious. Capsules $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovoid, bluntly pointed, thickened at the top, exserted, circumscissile below the middle; style short, stout; stigmas usually 2, recurved. Seeds 8–12, reniform, $\frac{1}{25}$ in. long, minutely rugose, dull-black. Fl. B. I. v. 4, p. 715; Wight, Icon. t. 1768; Trim. Fl. Ceyl. v. 3, p. 393; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363. —Flowers: Dec.

Rare. KANARA: *Talbot* ex *Woodrow.* I have seen no specimens from Kanara; there are none in Herb. Kew.—DISTRIB. India (W. Peninsula); Ceylon.

3. **Celosia polygonoides,** *Retz. Obs. Bot.* fasc. 2 (1781) p. 12. Perennial, 6–20 in. high; rootstock woody; stem diffusely branched; branches hairy. Leaves $\frac{1}{2}$–1 by $\frac{3}{8}$–$\frac{7}{8}$ in., broadly ovate, obtuse or subacute, entire, glabrous above, pubescent on the nerves beneath, base rounded, subcordate or shortly cuneate; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long, hairy. Flowers 2 or 3, in small distant clusters on erect slender terminal spikes with a hairy rhachis; bracteoles $\frac{1}{16}$ in. long, ovate, acute, scarious. Perianth $\frac{1}{12}$ in. long, white; sepals oblong-lanceolate, acute. Capsules nearly $\frac{1}{6}$ in. long, flask-shaped, obtuse, with a much thickened head, circumscissile below the middle; style very short; stigmas 2, recurved. Fl. B. I. v. 4, p. 715; Trim. Fl. Ceyl. v. 3, p. 394; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363.—Flowers: Nov.

Rare. S. M. COUNTRY: Badami, *Bhiva!*, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

Celosia cristata, Linn. Sp. Pl. (1753) p. 205. This, which seems scarcely if at all separable from *Celosia argentea,* is grown in gardens and found as an escape. As the well known *Cock's-comb* it develops under cultivation monstrous and curiously branched heads. Fl. B. I. v. 4, p. 715; Grah. Cat. p. 168; Dalz. & Gibs. p. 215; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 867; Watt, Dict. Econ. Prod. v. 2, p. 241.—VERN. *Murgha-ka-phul.*

2. **ALLMANIA,** R. Br.

Erect or diffuse herbs. Leaves alternate, narrow, entire. Flowers hermaphrodite, in terminal and axillary sessile or pedunculate heads; bracteoles 2, scarious. Perianth-segments 5, free or nearly so, scarious, oblong-lanceolate, erect in fruit. Stamens 5; filaments dilated at the base, connate in a membranous hypogynous cup; anthers 2-celled. Ovary 1-celled, ovoid, narrowed into a long straight style; ovule solitary, erect. Fruit a subglobose or ovoid circumscissilely dehiscent capsule. Seed erect, subglobose; testa black with a basal cup-shaped aril; embryo annular, surrounding copious albumen; cotyledons linear; radicle inferior.—DISTRIB. Tropical Asia; species about 3.

1. **Allmania nodiflora,** *R. Br. in Wall. Cat.* (1828) 6890. VAR. **aspera,** *Hook. f. Fl. B. I.* v. 4 (1885) p. 717. A much-branched herb 1–2 ft. high; branches slender, angular, hairy. Leaves 1¾–3 by ⅛–⅓ in., linear-lanceolate, acute, apiculate, more or less pubescent, base tapering; petioles 0 or obscure. Flowers in globose sessile or shortly stalked axillary and terminal heads ¼–⅝ in. in diam.; bracteoles exceeding the sepals, ¼ in. long, linear-lanceolate, with a long capillary awn, hairy along the keel on the back. Perianth ⅙–⅕ in. long; sepals oblong-lanceolate, acuminate, very acute, apiculate, with a strong midnerve which is often pubescent on the back. Capsules ⅛ in. in diam., membranous, subglobose, circumscissile about the middle. Seed $\frac{1}{10}$ in. in diam., subglobose, black, smooth, with a large membranous cup-shaped aril. *Allmania nodiflora,* Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363. *Chamissoa aspera,* Wight, Icon. t. 1772.

DECCAN: Purandhar Fort, *Bhiva!* S. M. COUNTRY: Badami, *Woodrow.*—DISTRIB. India (W. Peninsula).

3. **DIGERA,** Forsk.

Annual herbs with angular branches. Leaves alternate, entire, petiolate. Flowers in axillary pedunculate spikes, ternate, the 2 outer reduced to crested scales, the central perfect; bracts and bracteoles persistent. Perianth-segments 5, slightly connate below, oblong, erect, the 2 outer larger. Stamens 5, hypogynous; filaments free, filiform; anthers 2-celled; staminodes 0. Ovary 1-celled, truncate; ovule solitary, erect; style filiform; stigmas 2, recurved. Fruit a subglobose compressed crustaceous nut included in the perianth. Seed erect, globose; testa thin, adhering to the albumen; embryo annular; cotyledons linear; radicle descending.—DISTRIB. Throughout India; Ceylon, Afghanistan, Beluchistan, Arabia, N. Africa; species 1.

1. **Digera arvensis,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 65. An annual herb (becoming perennial, *Hook. f.*), 1–2 ft. high; branches glabrous, spreading. Leaves ¾–3 by ½–1¾ in., variable, thin, ovate or elliptic, acute or rounded at the apex, sometimes with reddish margins, glabrous; petioles ½–1 in. long. Flowers sessile, in threes in lax axillary pedunculate spikes 1–5 in. long; bracts and bracteoles $\frac{1}{10}$ in. long, ovate-lanceolate, acute, submembranous, persistent. Perianth ⅙ in. long, rose-colored; sepals ovate-oblong, acute. Stigmas 2, recurved. Fruit $\frac{1}{10}$–⅛ in. in diam., globose, somewhat compressed, margined, muriculate.

Seed yellowish-brown. Fl. B. I. v. 4, p. 717; Dalz. & Gibs. p. 218; Trim. Fl. Ceyl. v. 3, p. 395; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 868; Watt, Dict. Econ. Prod. v. 3, p. 112. *Desmochœta muricata*, DC. Cat. Hort. Monsp. (1813) p. 103; Wight, Icon. t. 732; Grah. Cat. p. 168.—Flowers: Sept.-Nov.

Common after the rains more or less throughout the Presidency. DECCAN: *Woodrow*; Poona, *Cooke*!; Dhulia, *Woodrow*! GUJARAT: *Woodrow*. SIND: *Woodrow*.—DISTRIB. India (Bengal, N.W. Provinces, W. Peninsula); Ceylon, Afghanistan, Beluchistan, Arabia, N. Africa.

4. **AMARANTUS,** Linn.

Annuals. Leaves alternate. Flowers small, monœcious or polygamous, in axillary clusters or dense terminal and axillary spikes or panicles; bracteoles 2. MALE FLOWERS: Perianth of 5 (rarely 1–3) membranous equal or subequal ovate-lanceolate segments. Stamens 5 (rarely 1–3); filaments free, subulate or filiform; anthers 2-celled; staminodes 0. FEMALE FLOWERS: Perianth-segments oblong or spathulate, erect in fruit. Ovary ovoid, compressed, 1-celled; ovule solitary, subsessile, erect; styles 1–3 or 0. Fruit an orbicular or ovoid compressed utricle, or a circumscissile membranous or coriaceous capsule. Seed erect, orbicular, compressed; testa crustaceous; embryo annular, enclosing floury albumen; cotyledons linear; radicle inferior.—DISTRIB. Tropical and subtropical; species undetermined, a large proportion known only in cultivation. Several species are grown in the Bombay Presidency as pot-herbs, and some of them make a very excellent spinach; one species is grown for its farinaceous seed.

Stamens 5; sepals 5.	
Leaf-axils with spines	1. *A. spinosus.*
Leaf-axils not spinous	2. *A. paniculatus.*
Stamens 3; sepals 3.	
Clusters of flowers axillary and in terminal spikes.	
Fruit circumscissile.	
Stem branching near the middle; yielding only 1 crop annually	3. *A. gangeticus.*
Stem branching near the base; yielding several crops annually	*A. gangeticus* var. *tristis.*
Fruit indehiscent.	
A low much-branched herb	4. *A. viridis.*
A tall succulent herb	5. *A. Blitum* var. *oleracea.*
Clusters of flowers all axillary; a prostrate annual; fruit usually circumscissile, sometimes indehiscent	6. *A. polygamus.*
Stamens 2; sepals 2	7. *A. tenuifolius.*

1. **Amarantus spinosus,** *Linn. Sp. Pl.* (1753) p. 991. An erect glabrous herb 1–2 ft. high; stems hard, often reddish, with many grooved branches and with sharp divaricate spines, often exceeding ½ in. long, in the leaf-axils. Leaves 1¼–3 by ½–1½ in., ovate or lanceolate, obtuse, spinous-apiculate, entire, glabrous above, sometimes scurfy beneath; main nerves numerous, slender, conspicuous below; petioles ¾–2½ in. long. Flowers very numerous, sessile, in dense axillary clusters and in terminal and axillary dense or interrupted spikes; bracteoles linear, bristle-pointed, usually longer than the sepals. Perianth of male flowers $\frac{1}{10}$–$\frac{1}{8}$ in. long; sepals 5, ovate, acute, bristle-pointed. Perianth of

female flowers scarcely $\frac{1}{16}$ in. long; sepals 5, oblong, obtuse, apiculate. Stamens 5. Capsule $\frac{1}{16}$ in. long, ovoid, thickened at the top, circumscissile about the middle, membranous, rugose; styles 2, divaricate, pubescent. Fl. B. I. v. 4, p. 718; Grah. Cat. p. 169; Dalz. & Gibs. p. 216; Wight, Icon. t. 513; Trim. Fl. Ceyl. v. 3, p. 396; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 869; Watt, Dict. Econ. Prod. v. 1, p. 215.—Flowers: Sept. VERN. *Kánte-Máth.*

Widely distributed throughout the Presidency in waste places, rubbish-heaps, and fields.—DISTRIB. Throughout India; Ceylon, many tropical countries.

The leaves make a fairly good spinach, though difficult to pick owing to the axillary spines. The root has considerable repute in native medicine. See Watt, Dict. Econ. Prod. l. c.

2. **Amarantus paniculatus,** *Linn. Sp. Pl.* ed. 2 (1763) p. 1406. A tall handsome plant 4–6 ft. high or more; stem stout, grooved and striate, glabrous or slightly pubescent. Leaves 2–6 by 1–3 in., elliptic-lanceolate, acute or acuminate, base cuneate; main nerves numerous, slender, prominent beneath; petioles 1–4 in. long. Flowers numerous, in dense thyrsoid gold-colored or red spikes, the central spikes the longest; bracteoles $\frac{1}{8}$–$\frac{1}{5}$ in. long, acicular, exceeding the sepals. Perianth $\frac{1}{10}$–$\frac{1}{8}$ in. long; sepals 5, oblong-lanceolate, acute, shortly awned. Stamens 5. Capsules $\frac{1}{8}$ in. long, ovoid, narrowed at the tip, circumscissile about the middle; styles 3, short. Seeds $\frac{1}{20}$–$\frac{1}{16}$ in. in diam., subglobose, white, red or black. Fl. B. I. v. 4, p. 718; Dalz. & Gibs. p. 215; Duthie, Field & Gard. Crops, part 3, p. 23, t. 68; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 869. *Amarantus frumentaceus*, Buch.-Ham. in Roxb. Fl. Ind. v. 3 (1832) p. 609; Wight, Icon. t. 720; A. DC. Orig. Pl. Cult. ed. 3 (1886) p. 282; Watt, Dict. Econ. Prod. v. 1, p. 211.—VERN. *Rájgira.*

Cultivated for its farinaceous grain, which forms the staple food of the poorer classes of the hill tribes in many parts of India.—DISTRIB. Cultivated or as an escape in E. and W. Asia and Africa.

3. **Amarantus gangeticus,** *Linn. Syst. Nat.* ed. 10 (1759) p. 1268. An erect herb 2–4 ft. high; stem stout, branching above the middle, often tinged with purple, grooved and striate, glabrous or nearly so. Leaves variable, 2–6 by 1–4 in., rhomboid-ovate or lanceolate or deltoid-ovate, obtuse, finely apiculate, often notched at the tip, glabrous, base long-tapering, decurrent on the petiole; main nerves numerous, prominent beneath; petioles 1–3 in. long. Flowers clustered in the axils and forming a long terminal more or less interrupted spike; bracteoles $\frac{1}{8}$ in. long, narrowly lanceolate-subulate, with a slender awn, membranous. Perianth $\frac{1}{8}$ in. long; sepals 3, lanceolate, with a long capillary awn, membranous. Stamens 3. Capsules $\frac{1}{10}$ in. long, ovoid, suddenly narrowed at the apex, circumscissile about the middle, rugose, membranous; styles 3, distinct. Seed $\frac{1}{16}$ in. in diam., lenticular, smooth and shining, black. Fl. B. I. v. 4, p. 719; Trim. Fl. Ceyl. v. 3, p. 396; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 869; Watt, Dict. Econ. Prod. v. 1, p. 212. *Amarantus oleraceus*, Willd. Sp. Pl. v. 4 (1805) p. 386 (*not* of Linn.); Roxb. Fl. Ind. v. 3, p. 605; Grah. Cat. p. 169; Wight. Icon. t. 715; Watt, Dict. Econ. Prod. v. 1, p. 214. Prain (Beng. Pl. l. c.) unites with this, *A. lanceolatus*, Roxb., *A. atro-*

purpureus, Roxb., *A. tricolor*, Willd., *A. melancholicus*, Willd., and *A. lividus*, Roxb.

Cultivated as a pot-herb and sometimes found as an escape.—DISTRIB. Throughout India; Ceylon, Tropical Asia, Africa, and America.

VAR. *tristis*, Prain, Beng. Pl. p. 869. An annual herb with many prostrate branches from near the base of the stem. The plant is cut down several times, a new crop of shoots springing up. Roxburgh (Fl. Ind. v. 3, p. 604) points out that it differs from *A. gangeticus* (*A. oleraceus*, Roxb.) in this particular as well as in its branching from the base and not from the middle of the stem as the type *A. gangeticus* does. *A. tristis* (sp.), Willd. Sp. Pl. v. 4 (1805) p. 385; Roxb. Fl. Ind. v. 3, p. 604; Grah. Cat. p. 169; Dalz. & Gibs. p. 215; Wight, Icon. t. 713; Watt, Dict. Econ. Prod. v. 1, p. 216. *A. polygamus*, Willd. Sp. Pl. v. 4 (1805) p. 384 (*not* of Linn.); Roxb. Fl. Ind. v. 3, p. 603; Wight, Icon. t. 714; Grah. Cat. p. 169.

Cultivated as a pot-herb.

4. **Amarantus viridis,** *Linn. Sp. Pl.* ed. 2 (1763) p. 1405. An erect much-branched glabrous herb 1–2 ft. high; branches grooved, glabrous, often purplish. Leaves 1–3 by ½–2 in., ovate or deltoid-ovate, obtuse, usually notched at the apex, glabrous, base truncate or cuneate; petioles ½–2 in. long. Flowers shortly pedicellate, pale green, in small axillary clusters and in slender tapering terminal and axillary paniculate spike-like racemes; bracteoles ovate-oblong, acute, with a green keel, shorter than the sepals. Sepals 3, ovate-oblong, $\frac{1}{20}$–$\frac{1}{16}$ in. long, membranous, with a strong green keel. Utricle $\frac{1}{15}$ in. long, indehiscent, suborbicular, compressed, pointed, rugose; styles 2 or 3, short. Seed $\frac{1}{25}$ in. in diam., lenticular, smooth, shining, black. Fl. B. I. v. 4, p. 720; Grah. Cat. p. 169; Trim. Fl. Ceyl. v. 3, p. 397; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 869; Watt, Dict. Econ. Prod. v. 1, p. 216.

A common weed in gardens and cultivated ground, *Graham*.

I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew. Dalzell & Gibson do not include the plant in their Bombay Flora, while Woodrow, though including it in his list, assigns it no habitat. The plant is very common in Ceylon (*Trimen*).—DISTRIB. Throughout India in waste places and cultivated ground; Ceylon, all tropical countries.

5. **Amarantus Blitum,** *Linn. Sp. Pl.* (1753) p. 990. VAR. **oleracea,** Hook. f. Fl. B. I. v. 4 (1885) p. 721. A tall erect succulent herb; stem stout, pale, grooved and striate, glabrous. Leaves 1½–4½ by ⅝–2 in., ovate, obtuse, usually notched at the tip, glabrous, base cuneate; main nerves slender, prominent beneath; petioles 1–2½ in. long. Flowers in axillary clusters and in terminal simple or branched spikes; bracteoles shorter than the sepals. Perianth $\frac{1}{16}$ in. long; sepals 3, linear-oblong, obtuse or acute. Utricle $\frac{1}{10}$ in. long, broadly ovate, acute, indehiscent; styles 3, very short. Seeds $\frac{1}{16}$ in. in diam., lenticular, smooth, shining, brown-black. Trim. Fl. Ceyl. v. 3, p. 398; Prain, Beng. Pl. p. 869. *Amarantus Blitum*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364. *A. oleraceus* (sp.), Linn. Sp. Pl. ed. 2 (1763) p. 1403. *Euxolus oleraceus*, Moq. in DC. Prodr. v. 13, part 2, p. 273; Dalz. & Gibs. p. 216.—VERN. *Tandulja*.

Cultivated in India and elsewhere in warm regions.

6. **Amarantus polygamus,** *Linn. Amœn. Acad.* v. 4 (1759) p. 294. A prostrate glabrous annual; stems striate. Leaves $\frac{3}{8}$-1 by $\frac{1}{4}$-$\frac{1}{2}$ in., obovate, obtuse, often notched at the tip, base tapering; petioles $\frac{1}{8}$-$\frac{1}{2}$ in. long. Flowers in axillary clusters; bracteoles shorter than the sepals, lanceolate-oblong, awned, membranous, with a strong midnerve. Perianth $\frac{1}{20}$-$\frac{1}{16}$ in. long; sepals 3, ovate-oblong, acute, membranous, awned and with a strong midnerve. Capsules $\frac{1}{16}$-$\frac{1}{12}$ in. long, ovoid, tapering towards the apex, usually circumscissile about the middle, rugose; styles 3, distinct, sometimes recurved at the apex. Seeds $\frac{1}{20}$ in. in diam., lenticular, smooth and shining, black. Fl. B. I. v. 4, p. 721; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 869; Watt, Dict. Econ. Prod. v. 1, p. 214. *Amaranthus polygonoides*, Willd. Sp. Pl. v. 4 (1805) p. 389; Roxb. Fl. Ind. v. 3 (1832) p. 602; Wight, Icon. tt. 512 & 719; Trim. Fl. Ceyl. v. 3, p. 397. *Amblogyna polygonoides*, Dalz. & Gibs. Bo. Fl. p. 218.—Flowers: Dec.-Mar. VERN. *Chavlái*; *Tándulja*.

A common weed in cultivated lands.—DISTRIB. Throughout India; Ceylon, most hot countries.

7. **Amarantus tenuifolius,** *Willd. Sp. Pl.* v. 4 (1805) p. 381. A prostrate glabrous herb; branches many from the root, 6–18 in. long, spreading. Leaves $\frac{1}{2}$–1 by $\frac{1}{6}$-$\frac{1}{4}$ in., oblong or oblanceolate-oblong, rounded and usually notched at the apex, glabrous, base much tapered into the petiole; nerves prominent beneath; petioles $\frac{1}{4}$-$\frac{1}{2}$ in. long, often obscure owing to the decurrent leaf-blade. Flowers in small axillary clusters (the smallest clusters of the Indian species, *Hook. f.*); bracteoles shorter than the sepals, ovate-lanceolate, obtuse, with a green midnerve. Perianth $\frac{1}{20}$ in. long; sepals 2, ovate-oblong, subacute, concave. Stamens 2. Utricle $\frac{1}{30}$ in. in diam., orbicular, compressed, membranous, indehiscent. Seed $\frac{1}{30}$ in. in diam., lenticular, shining, brown. Fl. B. I. v. 4, p. 722; Grah. Cat. p. 169; Wight, Icon. t. 718; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 869; Watt, Dict. Econ. Prod. v. 1, p. 216. *Mengea tenuifolia*, Moq. in DC. Prodr. v. 13, part 2, p. 271; Dalz. & Gibs. p. 218.—VERN. *Ghol*; *Chavlái*.

A common weed; leaves used as a pot-herb.—DISTRIB. India (Bengal, Panjáb, W. India); Tropical Africa.

Amarantus caudatus, Linn. Sp. Pl. (1753) p. 990. *Love-lies-bleeding*, a well known plant of English gardens with drooping tail-like spikes of crimson flowers, is often cultivated in gardens in the Presidency. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 363; Prain, Beng. Pl. p. 869; Watt, Dict. Econ. Prod. v. 1, p. 211.

Amarantus hypochondriacus, Linn. Sp. Pl. (1753) p. 991. *The Prince's Feather*, a very beautiful plant with crimson stems, leaves, and flowers, is cultivated as an ornamental plant in gardens. Watt, Dict. Econ. Prod. v. 1, p. 213.

5. ÆRUA, Forsk. (*Ærva*).

Herbs or undershrubs, erect, prostrate or climbing. Leaves alternate, or opposite, or fascicled. Flowers hermaphrodite or polygamous, in

simple or panicled spikes; bracts and 2 bracteoles small. Perianth 5 (rarely 4)-lobed; sepals equal or the outer broader, all or only the 3 inner woolly. Stamens 5 (rarely 4); filaments connate, with short or long intervening staminodes, in a short hypogynous cup; anthers 2-celled. Ovary ovoid or subglobose, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, short or long; stigma capitellate, or stigmas 2. Fruit a membranous utricle or circumscissile capsule with coriaceous crown. Seed inverse; testa coriaceous; embryo annular, surrounding floury albumen; cotyledons linear; radicle superior.—DISTRIB. Tropical Asia and Africa; species about 15. The oldest name for the genus is *Ouret* (Adans. Fam. Pl. v. 2 (1763) p. 268). This has been adopted by Hiern [Cat. Welw. Afr. Pl. v. 1, part 4 (1900) p. 893].

Sepals 5.
Spikes axillary and terminal.
Erect; leaves alternate; flowers unisexual, dicœcious ..... 1. *Æ. javanica.*
Climbing; leaves alternate and opposite; flowers bisexual... 2. *Æ. scandens.*
Spikes all axillary; leaves alternate; flowers unisexual and bisexual ..... 3. *Æ. lonata.*
Sepals 4; leaves filiform, fascicled; flowers bisexual ..... 4. *Æ. Monsoniæ.*

1. **Ærua javanica,** *Juss. in Ann. Mus. Par.* v. 2 (1803) p. 131. Suffruticose, hoary-tomentose, 2–3 ft. high; stem terete, branched, as thick as a goose-quill, covered with a thick, easily detachable stellate tomentum. Leaves alternate, variable, 1–2½ by ⅛–⅝ in., sessile or nearly so, linear-oblong or oblong-spathulate, obtuse and slightly retuse, or acute, densely tomentose. Flowers unisexual, usually dicœcious, dull-white, sessile in linear or oblong spikes 1–6 in. long arranged in naked terminal panicles; bracteoles broadly ovate, acute, white, hyaline. MALE FLOWERS: Perianth rather more than $\frac{1}{16}$ in. long; sepals elliptic-oblong, subobtuse, woolly at the back. Rudimentary ovary ovoid, acute, usually shortly stipitate with a short style and minutely bifid stigma. FEMALE FLOWERS: Perianth $\frac{1}{10}$ in. long; sepals oblong, subacute, apiculate; style about $\frac{1}{50}$ in. long; stigmas 2, as long as the style. Utricle orbicular-ovoid, very thin. Seed $\frac{1}{30}$ in. in diam., lenticular, shining, brown-black.

I have examined a large number of female flowers, but have not found the ring of staminodes depicted in Wight's Icon. t. 876, fig. 4. Fl. B. I. v. 4, p. 727; Dalz. & Gibs. p. 216; Wight, Icon. t. 876; Trim. Fl. Ceyl. v. 3, p. 402; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Watt, Dict. Econ. Prod. v. 1, p. 124.—Flowers: Aug.–Nov. VERN. *Buwádo* (Sindi).

DECCAN: Bijapur, *Cooke*! SIND: Shikarpur, *Cooke*!; Ruk Junction near Railway Station, *Cooke*!—DISTRIB. India (Panjáb, Central India, Birma, W. Peninsula); Ceylon, Arabia, Tropical Africa, Cape de Verde Islands.

Very close to if really distinct from *Ærua tomentosa*, Lam. Mr. C. B. Clarke, who has been recently studying the African species, informs me that in his opinion the African plant is distinct from the Indian one.

2. **Ærua scandens,** *Wall. Cat.* (1828) 6911. A climbing under-shrub; branches straggling, more or less pubescent or tomentose, terete, striate. Leaves alternate and opposite, 1½–4 by ½–1½ in., elliptic-lanceolate, acute, finely mucronate, pubescent, base tapering into a short petiole ¼–½ in. long. Flowers bisexual, in ovoid or cylindric

axillary and terminal subsessile solitary or twin woolly spikes ¼–1 in. long, sometimes forming a lax terminal panicle; bracteoles ovate acuminate, membranous, shorter than the sepals. Perianth $\frac{1}{10}$ in. long; sepals lanceolate, acuminate, silky on the back. Stamens 5 (rarely 4); filaments subulate, usually unequal, connate at the base into a short (rarely elongate) cup with interspersed short or long staminodes. Ovary glabrous, broadly ovoid; style short, about $\frac{1}{50}$ in. long; stigma capitate. Utricle broadly ovate, acute, very thin, indehiscent. Seed $\frac{1}{30}$ in. in diam., lenticular, smooth, shining, black. Fl. B. I. v. 4, p. 727; Dalz. & Gibs. p. 217; Wight, Icon. t. 724 (utricle and seed incorrectly shown); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 873; Watt, Dict. Econ. Prod. v. 1, p. 125.—Flowers: Dec.

Konkan: *Stocks*!; Bombay, *Dalzell & Gibson*; Revadanda, *Kanitkar*!; Marmagão, *Woodrow*. Deccan: Sinhagad, *Woodrow*, 338! Kanara: on the Kála naddi, common, *Ritchie*, $\frac{12}{3}\frac{18}{}$.—Distrib. India [Bengal, Assam, Panjáb, Himalaya (lower hills), Central India, Behar, W. Peninsula]; China, Malay Islands, Philippines, Tropical Africa.

3. **Ærua lanata,** *Juss. in Ann. Mus. Par.* v. 2 (1803) p. 131. Erect or prostrate with a long tap-root, branched from near the base; branches many, terete, pubescent or woolly-tomentose, striate. Leaves alternate, ¾-1 by $\frac{3}{8}$–$\frac{5}{8}$ in. on the main stem, ½–⅝ by ½–¼ in. on the branches, elliptic or obovate, or suborbicular, obtuse or acute, entire, pubescent above, more or less white with cottony hairs beneath; petioles ⅛–¼ in. long, often obscure. Flowers greenish-white, very small, sessile, often bisexual, in small dense subsessile axillary heads or spikes ¼–½ in. long, often closely crowded and forming globose clusters; bracteoles $\frac{1}{20}$ in. long, membranous, broadly ovate, concave, apiculate. Perianth $\frac{1}{16}$–$\frac{1}{20}$ in. long; sepals oblong, obtuse, sometimes apiculate, silky-hairy on the back. Utricle broadly ovoid, acute; stigmas 2. Seed $\frac{1}{30}$ in. in diam., smooth and polished, black. Fl. B. I. v. 4, p. 728; Grah. Cat. p. 168; Dalz. & Gibs. p. 217; Trim. Fl. Ceyl. v. 3, p. 402; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 873; Watt, Dict. Econ. Prod. v. 1, p. 124. *Ærua floribunda*, Wight, Icon. v. 6, t. 1776 *bis*, fig. A, and v. 5, t. 1776 (analyses only).—Flowers: Aug.–Oct. Vern. *Kapuri-maduri.*

A tolerably common weed. Deccan: *Woodrow*!; Kothrud near Poona, *Kanitkar*!; Poona, *Woodrow*! S. M. Country: Badami, *Woodrow*!—Distrib. Throughout India; Ceylon, Arabia, Tropical Africa, Java, Philippines.

4. **Ærua Monsoniæ,** *Mart. in Nov. Act. Acad. Cæs. Leop.-Carol.* v. 13 (1826) p. 291 (*Beitr. Amarant.* p. 83). Perennial with a long twisted tap-root, branched from the base; branches numerous, prostrate or ascending, subquadrangular, grooved, woolly (very densely so at the nodes). Leaves sessile, opposite and in fascicles at the nodes, ¼–¾ in. long, narrowly linear, spinous-pointed, glabrous or sometimes slightly woolly, the midrib prominent beneath. Flowers pale-pink, bisexual, crowded in numerous dense cylindric silky-villous spikes ½–1 in. long, terminating short lateral branches, racemosely arranged along the main branches; bracteoles $\frac{1}{20}$–$\frac{1}{16}$ in. long, lanceolate, acute, aristate. Perianth $\frac{1}{10}$ in. long; sepals 4, lanceolate, very acute, slightly villous on the back. Utricle ovoid, thinly membranous, enclosed in the staminal cup. Seed ellipsoid,

$\frac{1}{40}$ in. long, pale-brown, polished. Fl. B. I. v. 4, p. 728; Dalz. & Gibs. p. 217; Wight, Icon. t. 725; Trim. Fl. Ceyl. p. 403; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 873. *Celosia Monsonia*, Retz. Obs. fasc. 2, p. 13; Grah. Cat. p. 168.—Flowers: Oct.–Jan.

Dalzell without locality in Herb. Kew.! S. M. Country: Belgaum, *Ritchie*, 1998!, *Stocks*!; Badami, *Woodrow*!, *Kanitkar*!, *Bhiva*!—Distrib. India (Bengal, Central India, Birma, W. Peninsula).

6. **PSILOSTACHYS,** Hochst.

Slender dichotomously branched herbs. Leaves opposite, petiolate. Flowers minute, in branched pedunculate cymes spicately arranged near the ends of the filiform branches of the cyme. Perianth 5-partite, coriaceous; the 2 or 3 outer sepals strongly 3-nerved, broader than the inner. Stamens 5, free; anthers 2-celled; staminodes 0. Ovary subglobose or ovoid, 1-celled; ovule solitary; style slender; stigma capitellate. Utricle indehiscent. Seed inverse, orbicular or subglobose; testa coriaceous, exarillate; embryo hooked; cotyledons linear, thin, obtuse, broader than the slender ascending radicle.—Distrib. India, Arabia and Africa; species 3.

1. **Psilostachys sericea,** *Hook. f. in Benth. & Hook. Gen. Plant.* v. 3 (1880) p. 32. Herbaceous, erect, whole plant silky; rootstock woody; stem hard below and, as well as the branches, clothed rather thinly with long silky hairs which sometimes exceed $\frac{1}{4}$ in. long. Leaves $\frac{5}{8}$–1 by $\frac{3}{8}$–$\frac{3}{4}$ in., broadly ovate, acute, sparsely silky-hairy above, densely so beneath; petioles very short. Flowers in 3-branched pedunculate cymes, laxly spicately arranged near the tops of the cyme-branches; peduncles axillary, $1\frac{1}{2}$–$2\frac{1}{2}$ in. long; branches of the cyme capillary, $\frac{1}{4}$–2 in. long; flowers 2–8, sessile or very shortly pedicellate; bracts below the origin of the cyme-branches small, ovate-lanceolate, aristate, often surrounded by tufts of silky hairs; bracteoles below the flowers $\frac{1}{30}$ in. long, ovate-lanceolate, very acute. Perianth $\frac{1}{8}$ in. long, divided to within $\frac{1}{30}$ in. of the base; sepals 5, of equal length, the 3 outer ovate-oblong, acute, strongly 3-nerved, hairy and ciliate, the 2 inner sepals narrower than the outer. Utricle closely enclosed by the perianth, thinly membranous, subglobose; style short. Seed $\frac{1}{16}$ in. in diam., subglobose, smooth, shining, brown. Fl. B. I. v. 4, p. 726; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364. *Achyranthes sericea*, Kœn. in Roxb. Fl. Ind. v. 1 (1832) p. 675; Wight, Icon. t. 726. *Psilotrichum sericeum*, Dalz. & Gibs. Bo. Fl. (1861) p. 216.—Flowers: Jan.

Gujarat: Perim Island at the mouth of the Narbada River, *Cooke*!, *Raoji*!; coast of Kathiawar, *Dalzell*!—Distrib. Apparently endemic.

7. **NOTHOSÆRUA,** Wight.

An annual herb with opposite brachiate branches. Leaves opposite. Flowers minute, woolly, hermaphrodite, in axillary solitary or clustered spikes, bracteate and 2-bracteolate. Perianth hyaline; sepals 3–5, obtuse, 1-nerved. Stamens 1–2, hypogynous; filaments free; staminodes 0; anthers 2-celled. Ovary oblong, compressed; ovule solitary, pendulous from a long funicle; style short; stigma capitellate. Fruit a membranous oblong compressed utricle enclosed in the perianth.

Seed inverse, lenticular; testa crustaceous; embryo hooked, surrouuding floury albumen; cotyledons linear; radicle superior.—DISTRIB. Asia and Tropical Africa; species 1.

1. **Nothosærua brachiata,** *Wight, Icon.* v. 6 (1853) p. 1. An erect slender herb 6–20 in. high, glabrous or nearly so; stem branched from the base; branches spreading, usually glabrous. Leaves ¾–1½ by ⅜–¾ in., elliptic-lanceolate, acute or subobtuse, thinly membranous, green, glabrous or minutely puberulous, base tapering into a short often obscure petiole. Flowers sessile, crowded in small dense axillary subsessile, solitary or clustered, white cylindric spikes ⅙–½ in. long; bracts and bracteoles hyaline, acute, persistent. Perianth $\frac{1}{30}$ in. long; sepals acute or subacute, hyaline. Seeds minute, shining, black. Fl. B. I. v. 4, p. 726; Trim. Fl. Ceyl. v. 3, p. 401; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364. *Ærua brachiata*, Mart. Beitr. Amarant. p. 83, n. 3; Dalz. & Gibs. p. 217. *Pseudanthus brachiatus*, Wight, Icon. v. 5, t. 1776 (exclud. analyses), and vol. 6, t. 1776 *bis*, fig. B.

In Wight's Icones, v. 5, t. 1776, the draughtsman has made the mistake (which Wight subsequently explained [Icon. v. 5, part 2, p. 2]) of showing the analyses of *Ærva floribunda* (*Ærua lanata*, Juss.) under the drawing, the body of which is *Pseudanthus* (afterwards changed by Wight to *Nothosœrua* [Icon. v. 6, p. 1]) *brachiatus*. Wight rectifies this mistake in t. 1776 *bis*, vol. 6, the figure A in which represents *N. brachiata*.—Flowers: Nov.

KONKAN: *Law!* GUJARAT: Surat, *Woodrow.* SIND: *Stocks!*, *Cooke!*; Jemadar ka Landa near Karachi, *Stocks*, 1191!—DISTRIB. India (Birma, W. Peninsula); Ceylon, Mauritius, Tropical Africa.

8. ACHYRANTHES, Linn.

Herbs. Leaves opposite, petiolate, entire. Flowers hermaphrodite, in slender simple or panicled spikes, soon deflexed; bracts and bracteoles spinescent. Perianth of 4–5 rigid lanceolate-subulate aristate shining segments, ultimately becoming hardened and ribbed. Stamens 2–5; filaments filiform, subulate, connate at the membranous base, with as many quadrate staminodes which are toothed or with a toothed scale on the back; anthers 2-celled. Ovary oblong, subcompressed, 1-celled; ovule solitary, pendulous from a long basal funicle; style filiform; stigma capitellate. Fruit an oblong or ovoid utricle. Seed inverse, oblong; testa coriaceous; embryo annular, surrounding floury albumen; cotyledons linear or lanceolate; radicle erect.—DISTRIB. Species about 15, tropical and subtropical.

1. **Achyranthes aspera,** *Linn. Sp. Pl.* (1753) p. 204. Erect, 1–3 ft. high; stem stiff, not much branched; branches terete or obsoletely quadrangular, striate, pubescent. Leaves few, usually thick, 1½–2½ by 1–1¾ in., elliptic or obovate, sometimes nearly orbicular, usually rounded (rarely subacute) at the apex, finely and softly pubescent on both sides, entire; petioles ¼–¾ in. long. Flowers greenish-white, numerous, stiffly deflexed against the woolly-pubescent rhachis, in elongate terminal spikes which are at first short but soon lengthen, reaching as much as 20 in. long in fruit; bracts ⅛ in. long, broadly ovate, acuminate, membranous, aristate, persistent; bracteoles ⅛ in.

long, broadly ovate, concave, with a spine as long as the blade, hard in fruit, falling off with the fruiting perianth. Perianth $\frac{1}{6}$–$\frac{1}{4}$ in. long, glabrous and shining; sepals subequal, ovate-oblong, finely pointed, with narrow white membranous margins. Stamens 5; staminodes truncate, fimbriate. Utricle oblong-cylindric, truncate at the apex, thinly membranous, enclosed in the hardened perianth, smooth, brown, rather more than $\frac{1}{10}$ in. long. Seed subcylindric, truncate at the apex, rounded at the base, brown.

The hardened perianth containing the fruit disarticulates from the rhachis above the bract, carrying away with it the spinous bracteoles by the aid of which the perianth clings to the skins of cattle and the like and is transported. Fl. B. I. v. 4, p. 730; Grah. Cat. p. 168; Dalz. & Gibs. p. 218; Wight, Icon. t. 1777; Trim. Fl. Ceyl. v. 3, p. 404; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 874; Watt, Dict. Econ. Prod. v. 1, p. 81.—Flowers: Nov.–Jan. VERN. *A'ghâda.*

A common weed. KONKAN: *Law*! DECCAN: *Woodrow*; Mahableshwar, *Cooke*!, *H. M. Birdwood*; Poona, *Cooke*! SIND: *Woodrow.*—DISTRIB. Throughout India; Ceylon, Tropical Asia, Africa, Australia, and America.

EXCLUDED SPECIES.

ACHYRANTHES BIDENTATA, Blume, Bijdr. (1825) p. 545. This plant does not appear to have been found in the Bombay Presidency. The specimen in Herb. Kew. marked "Konkan, *Stocks*" is from the Nilghiri hills, where it was apparently collected by Mr. Foulkes. The other specimen from Stocks's herbarium has no locality assigned to it. Woodrow in his list (Journ. Bomb. Nat. v. 12 (1899) p. 364) remarks that the plant has not yet been found in the Bombay Presidency, and it is not included in Dalzell & Gibson's Bombay Flora. Fl. B. I. v. 4, p. 730.

9. CYATHULA, Lour.

Herbs or undershrubs. Leaves opposite, petiolate, entire. Flowers small, in large or small bracteate and bracteolate spicate or capitate fascicles with 1–2 flowers perfect and the rest imperfect; perianth-segments of imperfect flowers ultimately converted into rigid hooked awns. Perianth-segments of perfect flowers 5, scarious, 1-nerved, acuminate or with hooked awns. Stamens 5; filaments connate below with intervening lacerate or 2–3-fid staminodes into a hypogynous membranous cup; anthers 2-celled. Ovary-obovoid, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, filiform; stigma capitellate. Fruit an ovoid membranous utricle enclosed in the perianth, its apex areolate. Seed inverse, oblong; testa coriaceous; embryo annular; cotyledons linear, flat; radicle erect.—DISTRIB. Tropical Asia, Africa, and America; species 10.

1. **Cyathula prostrata,** *Blume, Bijdr.* (1825) p. 549. Stem prostrate below, thickened and rooting at the lower nodes, more or less hairy, purplish; branches erect or ascending, 1–2 ft. long. Leaves 1–2½ by ½–1¼ in., elliptic-rhomboid or ovate, subacute, hairy on both sides, sometimes with a pink tinge beneath; petioles very short. Flowers pale-violet, in small solitary drooping clusters laxly arranged in terminal spicate pedunculate racemes 4–6 in. long; rhachis slender, hairy; pedicels very short, about $\frac{1}{30}$ in. long; bracts ovate, acuminate, shortly

aristate, pubescent; bracteoles as the bracts. Perianth of perfect flowers $\frac{1}{2}$–$\frac{1}{10}$ in. long; sepals oblong, shortly apiculate, pubescent. Staminodes 2–3-fid. Ovary obovoid, glabrous; style $\frac{1}{10}$–$\frac{1}{16}$ in. long. Utricle thinly membranous, ovoid, enclosed in the perianth. Seed $\frac{1}{20}$ in. long, oblong-ellipsoid, yellowish-brown, smooth, shining. Fl. B. I. v. 4, p. 723; Dalz. & Gibs. p. 219; Trim. Fl. Ceyl. v. 3, p. 398; Prain, Beng. Pl. p. 872. *Desmochæta prostrata*, DC. Cat. Hort. Monsp. (1813) p. 102; Wight, Icon. t. 733; Grah. Cat. p. 168.

Rare. *Stocks* without locality in Herb. Kew.!—Distrib. India (Bengal, Sikkim, Khasia Mountains, W. Peninsula); Ceylon.

10. **PUPALIA,** Juss.

Herbs or undershrubs. Leaves opposite, petiolate. Flowers fascicled in simple or paniculate spikes; fascicles with 1 perfect flower, the rest imperfect; perianth of imperfect flowers ultimately converted into stellately spreading hooked awns. Perianth-segments of perfect flowers 5, almost equal, lanceolate, acuminate, 3–5-nerved. Stamens 5; filaments subulate, shortly connate at the base; anthers 2-celled; staminodes 0. Ovary 1-celled; ovule solitary, pendulous from a long basal funicle; style simple; stigma capitellate. Fruit an ovoid membranous utricle enclosed in the perianth, its top areolate. Seed inverse, rostellate; testa thinly coriaceous; embryo annular; cotyledons linear, flat; radicle ascending.—Distrib. Species 5, Asiatic and African.

Leaves [illegible] reaching 4 in. long ..... 1. *P. atropurpurea*.
Herbs [illegible] glabrous or nearly so; bracts and bracteoles [illegible] purple ..... 1. *P. atropurpurea*.
Stems [illegible] tomentose; outer bract of the flower [illegible] ..... 2. *P. lappacea*.
[illegible] membranous, awns [illegible] low ..... 2. *P. lappacea*.
Leaves [illegible] reaching 1½ in. long; awns brown ..... 3. *P. orbiculata*.

1. **Pupalia atropurpurea,** *Moq. in DC. Prodr.* v. 13, part 2 (1849) [illegible] biennial or annual, 2–5 ft.; branches long, straggling or semi-scandent, cylindric, glabrous or pubescent, slightly striate, often tinged with purple. Leaves 1–4 by $\frac{3}{8}$–2 in., ovate or elliptic-lanceolate, acuminate, mucronate, glabrous or nearly so, suddenly contracted at the base; petioles $\frac{1}{4}$–$\frac{3}{4}$ in. long. Flowers in sessile clusters in lax pedunculate terminal spikes 1–10 in. long, the imperfect flowers reduced to hooked purple awns; bracts $\frac{1}{10}$–$\frac{1}{8}$ in. long, broadly ovate, pungent, persistent; bracteoles as the bracts. Perianth $\frac{1}{8}$–$\frac{1}{5}$ in. long; sepals ovate-lanceolate, aristate, clothed with cottony wool, 3-nerved. Utricle thinly membranous. Seed $\frac{1}{10}$ by $\frac{1}{12}$ in., oblong-ellipsoid with subtruncate ends. Fl. B. I. v. 4, p. 723; Dalz. & Gibs. p. 219; Trim. Fl. Ceyl. v. 3, p. 399; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 872. *Desmochæta atropurpurea*, DC. Cat. Hort. Monsp. (1813) p. 102; Wight, Icon. t. 731; Grah. Cat. p. 168.

Gujarat: common, *Dalzell & Gibson.*—Distrib. India (Nipal, Bengal, W. Peninsula); Malaya, Ceylon, Java, Madagascar, S. Africa, Philippines.

2. **Pupalia lappacea,** *Moq. in DC. Prodr.* v. 13, part 2 (1849) p. 331. A large straggling undershrub; branches terete, tomentose.

Leaves 1¼–4 by ⅝–2 in., elliptic or ovate, acute or acuminate, finely apiculate, tomentose on both sides, ciliate, base rounded or shortly cuneate; main nerves numerous, conspicuous beneath; petioles $\frac{1}{16}$–¼ in. long. Flowers in close or distant clusters forming terminal spikes 4–10 in. long; rhachis tomentose, with a number of ovate acuminate pungent villous bracts ⅛–¼ in. long, which remain on the rhachis after the flowers fall; outer bracteole beneath the cluster ⅛ by ⅛ in., membranous, broad, concave, ovate-oblong, apiculate; imperfect flowers reduced to a number of unequal glabrous hooked awns, enlarged, stellately spreading and yellow in fruit, each cluster of awns during the flowering period supported by a lanceolate acute 3-nerved aristate bracteole nearly ⅛ in. long. Perianth ⅛ in. long; sepals lanceolate, aristate, 3-nerved, densely clothed with white wool. Utricle membranous, very thin, oblong, suddenly and shortly tapering at the apex into the style. Seed $\frac{1}{16}$ by $\frac{1}{12}$ in., ellipsoid, compressed, smooth and shining, black. Fl. B. I. v. 4, p. 724; Dalz. & Gibs. p. 219; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Fl. p. 872.—Flowers: Aug.–Nov.

DECCAN: Dongergaon near Ahmednagar, *Cooke*! S. M. COUNTRY: Badami, *Cooke*!, *Woodrow*!; Belgaum, *Ritchie*, 626! GUJARAT: Kathiawar, *Dalzell & Gibson*; Champanir, *Woodrow*!; Dakor, *Kanitkar*! SIND: Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (Behar, Panjáb, W. Tropical Himalaya, W. Peninsula); Tropical Asia and Africa.

3. **Pupalia orbiculata,** *Wight, Icon.* (1852) t. 1783. Stem woody at the base, often prostrate, stout, with long opposite branches, pubescent. Leaves rather thick, ¾–1¼ in. in diam., broadly elliptic or orbicular, obtuse, very shortly apiculate, sometimes notched, more or less hairy, suddenly tapering into the petiole which is short or obscure. Flowers in distant clusters forming stout spikes 4–8 in. long; rhachis pubescent, with persistent lanceolate acute aristate bracts ¼ in. long; outer bracteole of the flower-cluster ⅛ by $\frac{1}{16}$ in., ovate, acute, villous, 3-nerved; imperfect flowers reduced to hooked glabrous awns, which are enlarged, spreading, and pale-brown in fruit, each cluster of awns at flowering time supported by a rigid lanceolate spinous-pointed narrow glabrous bracteole ⅛–¼ in. long. Perianth ⅛ in. long; sepals lanceolate, shortly aristate, clothed with white wool, and with 3 broad nerves. Utricle oblong, obtuse, suddenly and very shortly attenuated into the style at the very apex, very thinly membranous. Seeds $\frac{1}{16}$ by $\frac{1}{16}$ in., oblong-ellipsoid, compressed, smooth and shining, black. Fl. B. I. v. 4, p. 724; Dalz. & Gibs. p. 219; Trim. Fl. Ceyl. v. 3, p. 400; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364.

KONKAN: The Ghats, *Dalzell & Gibson*. SIND: *Woodrow*.—DISTRIB. India (W. Peninsula); Ceylon.

11. **ALTERNANTHERA,** Forsk.

Herbs, usually prostrate. Leaves opposite. Flowers hermaphrodite, small, white, in axillary often clustered heads, bracteate and 2-bracteolate. Perianth-segments 5, unequal, the 2 lateral innermost and concave. Stamens 2–5; filaments short, connate in a cup with or without intervening staminodes; anthers 1-celled. Ovary suborbicular

or ovoid; ovule solitary, pendulous from a long basal funicle; style very short; stigma capitellate (rarely 2-fid). Fruit a compressed orbicular or obcordate utricle often with thickened or winged margins. Seed inverse, lenticular; testa crustaceous; embryo annular, surrounding floury albumen; cotyledons narrow; radicle superior.—DISTRIB. Species about 16, tropical and subtropical, abundant in Australia and Tropical America.

1. **Alternanthera triandra,** *Lam. Encyc. Méthod.* v. 1 (1783) p. 95. Herbaceous, much-branched from the root; branches 6–20 in. long, often purplish, prostrate or ascending, often rooting at the lower nodes, glabrous, the younger ones with 2 opposite lines of hairs. Leaves ½–2 by ⅛–¾ in. (in wet places sometimes reaching 4 by 1 in.), somewhat fleshy, linear-oblong, lanceolate or elliptic, obtuse or subacute, sometimes obscurely denticulate, shortly petiolate, glabrous. Flowers sessile, white, shining, in small axillary sessile heads; bracteoles $\frac{1}{20}$ in. long, ovate, scarious. Perianth $\frac{1}{10}$–$\frac{1}{8}$ in. long; sepals ovate, acute, scarious, 1-nerved. Ovary obcordate, broader than long, compressed; style very short; stigma capitellate. Utricle $\frac{1}{16}$–$\frac{1}{12}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., obcordate, compressed, with thickened margins. Seed $\frac{1}{20}$–$\frac{1}{16}$ in. in diam., suborbicular. Trim. Fl. Ceyl. v. 3, p. 405. *Alternanthera sessilis*, R. Br. Prodr. (1810) p. 417; Hook. f. Fl. B. I. v. 4, p. 731; Grah. Cat. p. 168; Dalz. & Gibs. p. 220; Wight, Icon. t. 727; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 875; Watt, Dict. Econ. Prod. v. 1, p. 199. *Achyranthes triandra*, Roxb. Fl. Ind. v. 1, p. 678.—Flowers: July–Dec. VERN. *Kanchri*; *Jaljamba.*

Common throughout the Presidency in damp places.—DISTRIB. Throughout the warmer parts of India; Ceylon and all warm countries.

The following plants not belonging to any of the foregoing genera are commonly cultivated in gardens:—

Telanthera ficoidea, Moq. in DC. Prodr. v. 13, part 2 (1849) p. 363, a native of Brazil, is a favorite edging in gardens, and is known to gardeners as *Alternanthera amabilis.* Its leaves take a fine crimson color in the Deccan from July to September. The plant is propagated readily by cuttings and makes an excellent edging for small beds, being easily kept in order by clipping.

Gomphrena globosa, Linn. Sp. Pl. (1753) p. 224. The *Globe Amaranth*, probably originating in America, is largely cultivated and often found as an escape. It is a tall branched annual with elliptic or obovate-oblong, acute or obtuse leaves and large globose yellowish-white or crimson heads of flowers 1–1½ in. in diam. with leafy bracts and pinkish-purple bracteoles. Fl. B. I. v. 4, p. 732; Grah. Cat. p. 169; Dalz. & Gibs. Suppl. p. 72; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 876; Watt, Dict. Econ. Prod. v. 1, p. 208.—Flowers: Aug.–Mar. VERN. *Jáfri-gundi.*

Order CIII. CHENOPODIACEÆ.

Herbs or shrubs. Leaves alternate (rarely opposite); stipules 0. Flowers small, usually green, hermaphrodite or 1-sexual; bracts 1 or 0; bracteoles 0 or 2. Perianth simple, sepaline; segments 3–5, free or connate, imbricate in bud (in female flowers sometimes 0). Stamens usually 5, opposite the perianth-segments, hypogynous or perigynous; filaments usually free, sometimes with intervening staminodes; anthers 2-celled. Ovary ovoid, globose or depressed, 1-celled; ovule solitary, basal or lateral, campylotropous; style terminal, short or long, stigma capitate, 2–3-lobed; or styles 2–3; or stigmas 2–5 free or slightly united, sessile. Fruit usually a utricle enclosed in the often enlarged fleshy perianth (when perianth is present). Seed erect, inverse or horizontal; testa crustaceous, coriaceous or membranous; albumen fleshy or floury or 0; embryo curved, annular, or spiral.—Distrib. Widely dispersed throughout the world; genera 80; species about 520.

Stems not twining; bracteoles free from the perianth; anthers erect or incurved in bud.
- Embryo annular or horseshoe-shaped.
  - Stems leafy, not jointed.
    - Fruiting perianth not winged; albumen copious.
      - Flowers all similar, hermaphrodite (sometimes polygamous in *C. ambrosioides*); leaves flat ..... 1. Chenopodium.
      - Flowers dimorphic, the males ebracteolate with 3–5 sepals, the females 2-bracteolate without sepals ..... 2. Atriplex.
    - Fruiting perianth with transverse wings; albumen scanty ..... 3. Kochia.
  - Stems jointed, fleshy; leaves 0.
    - Flowers in the scales of cone-like spikes; embryo horseshoe-shaped; albumen fleshy ..... 4. Arthrocnemum.
    - Flowers sunk in cavities in successive joints; embryo conduplicate; albumen 0 ..... 5. Salicornia.
- Embryo spiral; albumen 0.
  - Anthers not appendiculate.
    - Sepals not winged ..... 6. Suæda.
    - Sepals transversely winged.
      - Stem jointed ..... 7. Haloxylon.
      - Stem not jointed ..... 8. Salsola.
  - Anthers appendiculate; sepals not winged ..... 9. Halocharis.

Stems twining to the right: bracteoles 2, broad, adnate to the face of the perianth; anthers versatile ..... 10. Basella.

1. CHENOPODIUM, Linn.

Annual or perennial erect or prostrate herbs. Leaves alternate, entire, lobed or toothed. Flowers minute, hermaphrodite (rarely polygamous), clustered, forming axillary and terminal simple or branched spikes or racemes; bracts and bracteoles 0. Perianth usually 5 (rarely fewer)-lobed; segments concave, incurved, not altered in fruit. Stamens 5 or fewer, hypogynous or almost perigynous; anthers 2-celled. Disk 0 or annular. Ovary depressed-globose (rarely ovoid); ovule solitary; style usually 0; stigmas 2–5. Fruit a membranous utricle, enclosed in the perianth. Seed horizontal (rarely erect); testa crustaceous;

embryo nearly or quite annular, surrounding floury albumen.—DISTRIB. Species about 50, throughout the world.

Scentless or slightly fœtid eglandular herbs; stigmas 2; embryo perfectly annular; margin of seed acute.	
A tall scentless herb, sometimes 10 ft. high; seeds smooth, shining	1. *C. album.*
A low slightly fœtid herb 6–15 in. high; seeds rugose, dull.	2. *C. murale.*
A strongly aromatic glandular herb; stigmas 5; embryo incompletely annular; margin of seed obtuse	3. *C. ambrosioides.*

1. **Chenopodium album,** *Linn. Sp. Pl.* (1753) p. 219. Herbaceous, 1–10 ft. high, erect or ascending, mealy or green or reddish, inodorous; stems often striped. Leaves very variable in size and shape, reaching in cultivated plants sometimes 6 in. long (the upper leaves smaller and more entire than the lower), oblong, rhombic, deltoid or lanceolate, obtuse or acute, entire, toothed or irregularly lobulate; petioles long, slender. Flowers in clusters forming complex or lax paniculate often mealy spikes, which in cultivated forms become thyrsoid. Sepals $\frac{1}{16}$–$\frac{1}{12}$ in. long, oblong-lanceolate, keeled, closing over the thinly membranous utricle. Stigmas 2. Seed $\frac{1}{16}$ in. in diam., orbicular, compressed, with an acute margin, smooth, shining; embryo completely annular. Fl. B. I. v. 5, p. 3; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 878; Watt, Dict. Econ. Prod. v. 2, p. 265. *Chenopodium viride,* Linn. Sp. Pl. (1753) p. 219; Grah. Cat. p. 171.—Flowers: Nov. VERN. *Chákvat.*

A weed occurring chiefly in cultivated ground, very common in the Deccan, also cultivated as a pot-herb.—DISTRIB. Ubiquitous.

2. **Chenopodium murale,** *Linn. Sp. Pl.* (1753) p. 219. Herbaceous, 6–15 in. high, erect or ascending, branched, glabrous or nearly so, somewhat fœtid. Leaves bright-green, $1\frac{1}{4}$–4 by $\frac{7}{8}$–3 in., deltoid-ovate, acute or obtuse, irregularly lobulate and toothed (often sharply), base cuneate; petioles $\frac{3}{4}$–3 in. long. Flowers clustered, in short dense or lax cymes forming axillary racemes or panicles. Sepals $\frac{1}{16}$ in. long, oblong, subacute, closing over the fruit, scarcely keeled. Stigmas 2. Seed orbicular, $\frac{1}{16}$ in. in diam., with an acute margin, compressed, rugose, dull-black; embryo completely annular. Fl. B. I. v. 5, p. 4; Fl. Dan. v. 12 (1834) t. 2048; Trim. Fl. Ceyl. v. 3, p. 407; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Watt, Dict. Econ. Prod. v. 2, p. 268.—Flowers: Aug.

Scarcely indigenous in the Bombay Presidency. DECCAN: Poona, along the Railway bank of the S. M. Railway, *Cooke*! S. M. COUNTRY: Dharwar, *Woodrow.*—DISTRIB. Ubiquitous.

3. **Chenopodium ambrosioides,** *Linn. Sp. Pl.* (1753) p. 219. A tall erect much-branched highly aromatic herb with a camphoraceous odor, puberulous and glandular, not mealy; stem and branches striate, more or less glandular-pubescent. Leaves often with glands, $1\frac{1}{2}$-$3\frac{1}{4}$ by $\frac{1}{4}$–1 in., oblong-lanceolate, obtuse or acute, sinuate-dentate, the upper leaves almost entire, base tapering, running down into a short often obscure petiole. Flowers minute, clustered, forming slender axillary and terminal simple or paniculate leafy spikes, sometimes polygamous. Sepals orbicular-ovate, concave, obtuse, not keeled, closing over the fruit. Stigmas usually 5. Utricle membranous. Seed $\frac{1}{30}$ in. in diam.,

orbicular, smooth, shining, with an obtuse margin. Fl. B. I. v. 5, p. 4; Wight, Icon. t. 1786; Dalz. & Gibs. Suppl. p. 73; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 879; Watt, Dict. Econ. Prod. v. 2, p. 267.—Flowers: Aug.–Apr.

A weed usually occurring in cultivated ground, scarcely indigenous in the Bombay Presidency, but apparently so in S. India. DECCAN: Poona, a weed in gardens, *Cooke*!, *Woodrow*!, *Kanitkar*!—DISTRIB. India (Bengal, Silhet, S. India); widely spread in the Old World.

2. **ATRIPLEX,** Linn.

Herbs or shrubs usually mealy. Leaves alternate (rarely opposite). Flowers small, monœcious or polygamo-dioecious, clustered, the sexes often mixed, in axillary sessile fascicles or in simple or panicled spikes; bracts 0; bracteoles in male flowers 0, in female flowers 2, flat, accrescent, dilated in fruit and forming a 2-valved covering to it. MALE FLOWERS: Perianth 3–5-partite; sepals oblong or obovate, obtuse. Stamens 3–5, inserted at the base of the perianth; filaments free or connate below; anthers didymous. Ovary rudimentary or 0 (rarely perfect). FEMALE FLOWERS: Perianth 0. Disk 0. Ovary ovoid or depressed-globose; ovule oblique or vertical; stigmas 2, subulate or filiform, connate below. Fruit a membranous utricle rarely adnate to the seed, enclosed in the enlarged bracteoles. Seed erect or inverted, suspended from a long funicle or rarely (in hermaphrodite flowers only) horizontal; embryo surrounding floury albumen.—DISTRIB. Species about 100, in most temperate and tropical regions.

1. **Atriplex Stocksii,** *Boiss. Diagn.* Ser. 2, No. 4 (1859) p. 73. Shrubby, perennial, 8–20 in. high, monœcious, much branched, prostrate or suberect; stem and branches woody, terete, glabrous, white. Leaves ½–1 by ¼–¾ in., rather fleshy, elliptic, oblong, orbicular or somewhat obovate, obtuse, smooth, glabrous, whitish or glaucous, base acute; petioles ⅛ in. long. Male flowers in axillary clusters or short spikes. Fruiting bracteoles of female flowers reaching ⅜ in. in diam., orbicular or broadly ovate, labyrinthically veined, cuneate at the base, swollen and thickened above the utricle. Seed suborbicular, compressed, pale-brown, smooth. Fl. B. I. v. 4, p. 7; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364. *Atriplex repens*, Aitch. Pb. & Sind Pl. p. 125 (*not* of Roth). *Obione Stocksii*, Wight, Icon. t. 1789; Dalz. & Gibs. p. 212.—Flowers: Dec.–Jan.

GUJARAT: common near the sea, *Dalzell & Gibson*; Broach Collectorate, *Dalzell*!; Verawal, *Woodrow*! SIND: *Stocks*, 452!; *Bhola Puran*!; Karachi, *Vicary*!, *Cooke*!; Hydrabad, *Cooke*!—DISTRIB. India (W. Peninsula).

Atriplex hortensis, Linn. Sp. Pl. (1753) p. 1053. A stout erect polygamous succulent annual often tinged with red or purple. Leaves not mealy, the lower deltoid, the upper usually ovate-lanceolate. Fruiting bracteoles thin, nearly free, elliptic or orbicular, reticulately veined, obtuse, sometimes mucronate.

The origin of the plant is unknown, it being found only under cultivation or in cultivated ground. It is cultivated as a spinach more or less throughout India and also in Europe, where it is known as *Orache* or *Mountain Spinach*. Fl. B. I. v. 5,

p. 6; Grah. Cat. p. 171; Dalz. & Gibs. Suppl. p. 73; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Prain, Beng. Pl. p. 880; Watt, Dict. Econ. Prod. v. 1, p. 350.—VERN. *Suraka*; *Chandanbatva.*

3. **KOCHIA,** Roth.

Herbs or undershrubs usually villous or pubescent, stems slender. Leaves alternate, sessile, narrow, entire. Flowers axillary, solitary or clustered, hermaphrodite or female (rarely only male); bracts 0. Perianth subglobose; lobes 5, coriaceous, incurved, closing over the utricle, girt by 5 free or confluent horizontal wings. Stamens 5, usually exserted, inserted at the bottom of the perianth; anthers large, ovate. Ovary depressed-globose; style slender; stigmas 2–3, capillary. Utricle depressed, membranous. Seed horizontal, ovoid, or orbicular; testa membranous; albumen scanty; embryo annular.—DISTRIB. Europe, temperate Asia, N. & S. Africa, N.W. America; species about 20.

1. **Kochia indica,** *Wight, Icon.* (1852) t. 1791. A tall erect branched annual; stem and branches more or less woolly, white, striate. Leaves $\frac{1}{4}$–$1\frac{1}{4}$ by $\frac{1}{10}$–$\frac{1}{4}$ in., linear-lanceolate, sessile, acute, pubescent or villous on both sides, base tapering. Flowers axillary, solitary or 2 together. Perianth woolly, about $\frac{1}{10}$ in. across when spread out, divided about $\frac{1}{4}$ the way down; segments hooded, mucronate, incurved; wing broadly ovate, scarious. Utricle thinly membranous; stigmas 2, filiform, $\frac{1}{30}$ in. long. Seed $\frac{1}{10}$ in. in diam., orbicular or ovoid, black. Fl. B. I. v. 5, p. 11; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364; Watt, Dict. Econ. Prod. v. 4, p. 567.—Flowers: Sept.

SIND: Sibi, *Vaidya*!—DISTRIB. India (N.W.; W. Peninsula); Afghanistan.

Woodrow in his list of Bombay Plants published in the Journal of the Bombay Nat. Hist. Soc. v. 12 (1899) p. 364, gives *Kochia scoparia* as occurring at Sibi.—I have seen no specimens from that locality, and there is only 1 sheet of the plant at present in Herb. Kew. contributed by Royle, but without any habitat assigned to it.

4. **ARTHROCNEMUM,** Moq.

Fleshy leafless jointed branching shrubs or herbs. Flowers minute, hermaphrodite, 2–3 together in the axils of scaly bracts, forming sessile cone-like spikes; bracteoles 2. Perianth ventricose, usually 3–4-gonous, truncate or 3–5-toothed at the apex, at length spongy. Stamen 1; anther oblong. Ovary ovoid, narrowed to the tip; ovule solitary, subsessile; stigmas 2, shortly connate below, subulate. Fruit an ovoid compressed utricle with hardened pericarp, enclosed in the swollen perianth. Seed erect, ovoid, compressed; testa membranous, smooth; albumen farinaceous; embryo dorsal, comma-shaped; radicle stout, inferior.—DISTRIB. Saline places in temperate and tropical regions; species 7 or 8.

1. **Arthrocnemum indicum,** *Moq. Chenopod. Enum.* (1840) p. 113. Perennial, suffruticose, diffuse, glaucous-green; stems usually prostate; branches numerous, with a woody core, erect or ascending, jointed, very fleshy, the joints short, clavate, thick, spongy, truncate, dilated and

usually 2-toothed at the top. Flowers in cylindric blunt spikes $\frac{1}{2}$–$\frac{3}{4}$ in. long; bracteoles spongy. Anthers large, oblong-ovoid, $\frac{1}{30}$–$\frac{1}{25}$ in. long. Seed trigonous, much compressed; testa thin, crustaceous, yellow. Fl. B. I. v. 5, p. 12; Dalz. & Gibs. p. 212; Trim. Fl. Ceyl. v. 3, p. 407; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 881; Watt, Dict. Econ. Prod. v. 1, p. 328. *Salicornia indica*, Willd. in Ges. Naturf. Fr. Neue Schr. v. 2 (1799) p. 111, t. 4, fig. 2; Wight, Icon. t. 737; Grah. Cat. p. 171. *Arthrocnemum glaucum*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365 (*not* of Ung.).—Flowers: Dec. VERN. *Machur*.

Common on salt-ground near the coast, *Dalzell & Gibson*. KONKAN: Bassein, abundant, *Graham*. SIND: Karachi, *Cooke!*, *Woodrow*. Graham says it is pickled by the natives.—DISTRIB. India (Bengal, W. Peninsula); Ceylon, Tropical Africa.

5. **SALICORNIA,** Linn.

Fleshy jointed leafless branched shrubs or herbs. Flowers minute, hermaphrodite, 3-nate, in the axils of scaly bracts sunk in superposed and decussately opposite cavities of the internodes, forming sessile cone-like spikes; bracteoles 2. Perianth obpyramidal. Stamen 1; anther oblong. Ovary ovoid, narrowed to the tip; ovule subsessile; stigmas 2, subulate. Fruit an ovoid compressed utricle with membranous pericarp, enclosed in the spongy perianth. Seed erect, compressed; testa hispid with hooked hairs; albumen 0; embryo conduplicate; radicle inferior, parallel to the folds of the cotyledons.—DISTRIB. Temperate and tropical regions; species 8.

1. **Salicornia brachiata,** *Roxb. Fl. Ind. ed. Carey & Wall.* v. 1 (1820) p. 82. Shrubby, more or less erect, much branched; branches rather slender, opposite, the joints $\frac{1}{4}$–$\frac{1}{2}$ in. long, slightly dilated and 2-toothed. Flowers in slender cylindric spikes 1–3 in. long. Utricle membranous, ovoid, subacute. Seed pale-brown, hispid with white hairs. Fl. B. I. v. 5, p. 12; Wight, Icon. t. 738; Trim. Fl. Ceyl. v. 3, p. 408; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 881; Watt, Dict. Econ. Prod. v. 6, part 2, p. 387.—Flowers: Nov.–Dec. VERN. *Machul.*

GUJARAT: Nausari, *Kanitkar!*; Porbandar, *Woodrow*; Dwarka, *Bhiva!*; Balsar, *Kanitkar!*—DISTRIB. India (Bengal, W. Peninsula); Ceylon.

The natives pickle the young shoots and sometimes use them as a pot-herb.

6. **SUÆDA,** Forsk.

Herbs or shrubs usually growing in saline places. Leaves fleshy, ternate, terete (rarely flattish). Flowers minute, axillary, usually hermaphrodite, bracteate and 2-bracteolate. Perianth short, globose or urceolate, 5-lobed or 5-partite; segments equal or unequal, simple, gibbous or almost winged. Stamens 5; filaments short; anthers large. Ovary ovoid or orbicular, usually sessile, with a wide base, adnate below to the perianth, rounded or truncate at the apex; ovule solitary, subsessile; style 0; stigmas 2–5, minute, subulate, recurved, papillose throughout. Fruit a small membranous or spongy utricle included in the perianth. Seed erect, horizontal or oblique; testa coriaceous or

crustaceous; albumen 0 or scanty; embryo slender, somewhat spiral.—Distrib. Species about 40 on saline shores and in deserts.

Perennial; seed usually erect.	
Flowers hermaphrodite; stigmas 3.	
Usually erect; flowers axillary, 1–3-nate; bracteoles with entire or slightly toothed margins	1. *S. fruticosa.*
Diffusely branched; leaves glaucous-green; flowers in dense many-flowered clusters; bracteoles with pectinate margins	2. *S. nudiflora.*
Flowers polygamous; stigmas 2–5; bracteoles with entire margins	3. *S. monoica.*
An annual erect herb; stigmas 2; seed usually horizontal	4. *S. maritima.*

1. **Suæda fruticosa,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 70. Shrubby, usually erect, much-branched; stem pale, glabrous. Leaves fleshy, subsessile, ½-terete, variable, ⅕–⅝ by 1/16–⅛ in., linear-oblong or ellipsoid or somewhat obovate, obtuse, narrowed at the base, the floral leaves short. Flowers hermaphrodite, axillary, solitary or 2–3-nate; bracteoles membranous, about 1/20 in. long, ovate, acute, entire or with slightly denticulate margins. Perianth in fruit subglobose, 1/10 in. long; segments thick, oblong, concave, obtuse, incurved. Utricle obovoid, thickened at the top; stigmas 3, short, spreading. Seed 1/25 in. long, obliquely ovoid, somewhat beaked, slightly compressed, smooth and shining, black when ripe. Fl. B. I. v. 5, p. 13; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Watt, Dict. Econ. Prod. v. 6, part 3, p. 386. *Salsola fruticosa,* Linn. Sp. Pl. ed. 2 (1762) p. 324; Grah. Cat. p. 170. *Salsola Láná,* Edgew. in Hook. Journ. Bot. v. 2 (1840) p. 286.—Flowers: Nov.–Dec. Vern. *Moras*; *Ushuk-láni.*

Gujarat: Dwarka (Kathiawar), *Woodrow*; Bhavnagar (Kathiawar), *Woodrow.* Sind: *Cooke*!—Distrib. India (North-west, Panjáb, W. Peninsula); Africa, America.
The plant is eaten by camels, and crude soda is prepared from it in Sind.

2. **Suæda nudiflora,** *Moq. in Ann. Sc. Nat.* v. 23 (1831) p. 316. A diffusely branched woody perennial undershrub; stems prostrate, much-branched, smooth, yellowish. Leaves numerous, soon falling, ¼–½ by 1/12–⅛ in., elliptic-oblong or linear-obovate, very obtuse, rigid, glabrous, at first flattish, afterwards ½-terete, glaucous-green (*Trimen*), base narrowed. Flowers hermaphrodite, axillary, in dense globose many-flowered clusters, forming dense spikes leafless in the upper part; bracteoles ovate, acute, membranous, with pectinate margins. Perianth 1/10 in. long, obovoid; segments oblong, obtuse. Utricle ovoid; stigmas 3. Seed erect, about 1/25 in. in diam., lenticular, smooth, shining, black. Fl. B. I. v. 5, p. 14; Dalz. & Gibs. p. 213; Trim. Fl. Ceyl. v. 3, p. 409; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 878; Watt, Dict. Econ. Prod. v. 6, part 3, p. 386. *Suæda indica,* Moq. in Ann. Sc. Nat. v. 23 (1831) p. 316; Wight, Icon. t. 1796; Dalz. & Gibs. p. 213. *Salsola nudiflora,* Willd. Sp. Pl. v. 1 (1797) p. 1313; Grah. Cat. p. 170.—Vern. *Moras.*

Dalzell & Gibson without locality. Konkan: salt-marshes in Salsette, *Graham.*—Distrib. India (Orissa on the sea-coast; W. Peninsula); Ceylon.
The green leaves are eaten by the natives wherever the plant occurs.

3. **Suæda monoica,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 70. A small erect bush; branches numerous, ascending, marked with promi-

nent leaf-scars, pale, glabrous. Leaves sessile, $\frac{1}{2}$–1 by $\frac{1}{20}$–$\frac{1}{10}$ in., linear, obtuse or subacute, sometimes apiculate, bright-green. Flowers polygamous, in slender lax spikes, the clusters distant, each in the axil of a short leaf; bracteoles minute, ovate, acute, entire. Perianth $\frac{1}{10}$ in. long; segments oblong, obtuse. Stigmas 2–5, short. Seed vertical, ovoid, smooth, shining, black. Fl. B. I. v. 5, p. 13; Wight, Icon. t. 1792; Trim. Fl. Ceyl. v. 3, p. 408; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365.—Flowers: Nov.–Dec.

KONKAN: Dharamtar (Colaba districts), *Woodrow*! SIND: Karachi, *Woodrow*.—DISTRIB. India (W. Peninsula); Ceylon, Arabia, Tropical Africa.

4. **Suæda maritima,** *Dumort. Fl. Belg.* (1827) p. 22. Annual; stems woody at the base, erect, 1½–2 ft. high, with numerous very slender erect branches. Leaves numerous, $\frac{3}{8}$–1 by $\frac{1}{40}$–$\frac{1}{16}$ in., narrowly linear (sometimes filiform), fleshy, subacute, the floral leaves very small. Flowers in small few-flowered globose clusters forming very slender elongate, lax spikes; bracteoles ovate, membranous, entire. Perianth scarcely $\frac{1}{30}$ in. long; segments rounded, covering the utricle. Stigmas 2, long, slender. Seed obliquely ovoid or suborbicular, $\frac{1}{25}$ in. long, smooth, shining, black. Fl. B. I. v. 5, p. 14; Trim. Fl. Ceyl. v. 3, p. 409; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 878; Watt, Dict. Econ. Prod. v. 6, part 3, p. 386. *Salsola indica*, Willd. Sp. Pl. v. 1 (1797) p. 1317; Grah. Cat. p. 170. *Chenopodina indica*, Wight, Icon. t. 1793.—Flowers: May (*Woodrow*). VERN. *Láná*; *Láni*.

KONKAN: salt-marshes in Salsette, *Graham*. SIND: *Woodrow*.

I have not seen a specimen from either locality.—DISTRIB. India (Panjáb, Bengal, W. Peninsula); Ceylon, N.W. Asia, N. Africa, Europe, N. America.

The green leaves are eaten and considered a wholesome vegetable. The plant is also incinerated to produce an impure sodium carbonate.

7. HALOXYLON, Bunge.

Shrubs or small trees with opposite jointed branches. Leaves opposite, triangular and short, or elongate and terete. Flowers small, hermaphrodite, solitary or spicate; bracteoles 2. Perianth 5-partite; segments concave, accrescent, horizontally winged. Stamens 5 or fewer, on the margin or base of a cupular disk with alternating round or square staminodes; filaments linear-subulate; anthers ellipsoid, obtuse. Utricle subglobose or depressed, enclosed in the perianth; stigma 2-lobed, or stigmas 3–4, recurved. Seed horizontal; testa membranous; albumen 0; embryo green, plano-spiral.—DISTRIB. S. Europe, N. Africa, Western and Central Asia, India; species 8–10.

Leaves distinct	1. *H. recurvum.*
Leaves reduced to the dilated tips of the joints	2. *H. salicornicum.*

1. **Haloxylon recurvum,** *Bunge, ex Boiss. Fl. Orient.* v. 4 (1879) p. 949. A straggling bush turning black in drying, glabrous, pruinose, with divaricate spreading straight or recurved branches. Leaves $\frac{1}{8}$–$\frac{1}{3}$ in. long, trigonous or $\frac{1}{2}$-terete, ovate-subulate or ellipsoid, obtuse or acute, spreading or recurved. Flowers axillary, forming strict spikes 1–6 in. long; floral leaves $\frac{1}{10}$ in. long, rotund-ovate, fleshy, with membranous

margins; bracteoles $\frac{1}{10}$ by $\frac{1}{16}$ in., elliptic-oblong, concave, fleshy, with membranous margins. Perianth-segments somewhat fleshy, $\frac{1}{6}$–$\frac{1}{5}$ in. long, ovate, subobtuse, closing over the utricle; wing membranous, finely veined, about $\frac{1}{12}$ in. long, orbicular, attached at the middle of the back of the segment. Seed $\frac{1}{10}$ in. in diam., orbicular, flattened; embryo spirally coiled. Fl. B. I. v. 5, p. 15; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Watt, Dict. Econ. Prod. v. 4, p. 199. *Haloxylon Stocksii*, Hook. f. in Hook. & Benth. Gen. Pl. v. 3, p. 70. *Caroxylon indicum*, Wight, Icon. t. 1794.—Flowers: Nov. VERN. *Khâri-lâni*; *Kâro*.

SIND: *Stocks*, 438!; Sukkur, *Cooke*!—DISTRIB. India (Panjáb, Sind, Coimbatore, Birma); Afghanistan, Yunnan.

The plant is used as fodder for camels in the Panjáb and Sind. It is also extensively employed for the manufacture of crude sodium carbonate (*Sajji-khâr*).

2. **Haloxylon salicornicum,** *Bunge, ex Boiss. Fl. Orient.* v. 4 (1879) p. 949. An erect much-branched leafless shrub; stem and branches pale-yellow, not drying black, the joints produced into 2 long triangular points which take the place of leaves and are woolly within. Flowers in erect spikes; bracteoles $\frac{1}{16}$ in. long, nearly as broad as long, elliptic or obovate, rounded at the top, very thick, with woolly axils and membranous margins. Perianth-segments in flower $\frac{1}{12}$ in. long; wing $\frac{1}{10}$ in. long, orbicular-obovate, veined, membranous, attached to the back of the segment above the middle. Seed horizontal, $\frac{1}{16}$ in. in diam., flattened, orbicular. Fl. B. I. v. 5, p. 16; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365.—Flowers: Oct.

Rare. There is 1 specimen in Herb. Kew. from Dalzell which is ticketed "Scinde" in Dalzell's handwriting, and which appears to have been sent to him by Stocks. Woodrow in his list of Bombay Plants (Journ. Bomb. Nat. l. c.) gives Sibi (Upper Sind) as the habitat of the plant, but I have seen no specimens from that locality. Mr. Drummond informs me that it is very abundant in the Panjáb.—DISTRIB. India (Panjáb); Beluchistan, Afghanistan.

8. SALSOLA, Linn.

Herbs or shrubs; branches not jointed. Leaves usually alternate, sessile or amplexicaul, often pungent at the tip. Flowers hermaphrodite, axillary, solitary or fascicled; bracteoles 2. Perianth 5 (rarely 4)-partite; segments concave, accrescent in fruit, usually furnished with a broad scarious horizontal wing attached above the middle completely embracing the utricle. Stamens 5 or fewer, usually hypogynous. Utricle ovoid or subglobose, fleshy or membranous; stigmas 2–3, subulate or linear. Seed usually horizontal; testa membranous; albumen 0; embryo spiral.—DISTRIB. Europe, N. & S. Africa, temperate Asia, Australia, N. America; species about 40.

1. **Salsola fœtida,** *Del. Fl. Ægypt. Illustr.* (1812) n. 310. A large excessively branched pale hoary shrub, reaching 4 ft. or more in height (*Aitchison*); branches numerous, slender, twiggy. Leaves minute, suborbicular, fleshy, the floral leaves imbricate, forming very short cylindrical spikes; bracteoles $\frac{1}{20}$ in. long, broadly ovate or orbicular, fleshy. Perianth scarcely $\frac{1}{20}$ in. long, oblong, rounded at the apex; wings horizontal, attached about the middle of the back of the perianth, $\frac{1}{10}$ in. long, obovate, rounded, flat, thinly membranous,

subtransparent, white, shining. Ovary ovoid or subglobose; stigmas 2, large, recurved. Fl. B. I. v. 5, p. 18; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Watt, Dict. Econ. Prod. v. 6, part 2, p. 392. *Salsola spinescens*, Wight, Icon. t. 1795 (*not* of Moq.).—Flowers: Dec. VERN. *Lánan*, *Ellakura*.

SIND: *Stocks*; Sukkur, *Cooke*!

The branches often bear globose fulvous-villous galls, the work of insects, surrounded by linear or linear-lanceolate fulvous-villous leaves which resemble somewhat the involucre of a Composite. I find in a note made by me when I collected the plant in Sukkur in 1891, that the fresh flowers had an odor of rotten fish.—DISTRIB. India (Panjáb, W. Peninsula); Beluchistan, Persia, Arabia, N. Africa.

9. **HALOCHARIS,** Moq.

Annual usually small herbs, prostrate or suberect, hispidulous; branches often verticillate, not jointed. Leaves alternate, sessile, fleshy, tipped with rigid hairs. Flowers hermaphrodite, axillary, solitary; bracteoles 2. Perianth-segments 5, lanceolate, membranous, hyaline, nerveless, unaltered in fruit. Stamens inserted on a fleshy disk; filaments linear; anthers linear, the cells narrow, parallel, separate, the connective produced into a sessile or stipitate flattened or inflated appendage; staminodes 0. Utricle included in the perianth, broadly ovoid or orbicular, compressed, membranous, rugulose; stigmas 2, elongate, subulate. Seed inverse, lenticular, compressed; testa membranous; albumen 0; embryo plano-spiral.—DISTRIB. Persia, Afghanistan, Beluchistan, India; species 5.

1. **Halocharis sulphurea,** *Moq. in DC. Prodr.* v. 13, part 2 (1849) p. 201 *in part.* An erect branched herb of a peculiar bluish-grey color (*Aitchison*), 3–18 in. high, hispid with long bristles. Leaves $\frac{1}{4}$–$\frac{3}{8}$ in. long, linear, subtrigonous, ciliate with long hairs. Flowers white (*Woodrow*) or light-purple (*Aitchison*), in capitate clusters which are spicate on short branches; bracteoles linear or linear-lanceolate, keeled, very hirsute, as long as the perianth-segments. Perianth-segments $\frac{1}{6}$ in. long, lanceolate, membranous, the outer densely woolly. Anther-cells separate, $\frac{1}{16}$ in. long; pollen yellow; appendage as long as and broader than the anther-cells, erect, ovoid-oblong, inflated, white (*Woodrow*) or sulphur-yellow (*Boissier*).

Woodrow, who has had an opportunity of examining the *fresh* plant which he collected at Sibi (Upper Sind) and of which there are 2 sheets in Herb. Kew., describes the flowers and the appendage of the anthers as white. Fl. B. I. v. 5, p. 19; Boiss. Fl. Orient. v. 4, p. 975; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365.—Flowers: Sept.–Oct.

SIND: Rendli (Sibi districts), *Woodrow*!—DISTRIB. India (Panjáb); Persia, Assyria.

10. **BASELLA,** Linn.

A much-branched twining fleshy glabrous herb. Leaves alternate, broad, entire. Flowers hermaphrodite, sessile, spicate; bracts minute, caducous; bracteoles 2, connate in a 2-lipped cup and adnate to the perianth. Perianth fleshy, 5-fid, becoming at length berry-like in fruit; lobes short, incurved. Stamens 5, inserted on the mouth of the perianth-tube; filaments short, erect in bud; anthers versatile. Ovary

globose; ovule subsessile; styles 3, connate at the base; stigmas linear-clavate, papillose within. Fruit a globose utricle, included in the fleshy perianth; pericarp thin, adnate to the seed. Seed erect, subglobose; testa crustaceous; albumen scanty; embryo plano-spiral; cotyledons large, thin, convolute.—DISTRIB. Asia and Tropical Africa, elsewhere cultivated in the Tropics; species 2.

A new species, *Basella paniculata*, a native of German East Africa, has recently been described by Volkens (Engl. Bot. Jahr. v. 38 [1905] p. 81).

1. **Basella rubra,** *Linn. Sp. Pl.* (1753) p. 272. A perennial herb; stem very long, slender, twining to the right, succulent, glabrous, much-branched. Leaves 2–5 by 1–3 in. (often larger under cultivation), broadly ovate, acute or acuminate, thick, apiculate, entire, base often cordate, narrowed into the petiole; petioles ½–1 in. long. Flowers white or red, sessile, few, in lax pedunculate spikes 1–6 in. long; bracts small, apiculate; bracteoles rather longer than the perianth, oblong, obtuse. Perianth divided about ½-way down; segments elliptic, obtuse. Fruit of the size of a pea, red, white or black. Fl. B. I. v. 5, p. 20; Trim. Fl. Ceyl. v. 3, p. 410; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 882; Watt, Dict. Econ. Prod. v. 1, p. 404. *Basella alba*, Linn. Sp. Pl. (1753) p. 272; Wight, Icon. t. 896; Grah. Cat. p. 170; Dalz. & Gibs. Suppl. p. 73; Watt, Dict. Econ. Prod. v. 1, p. 403.—Flowers: Oct.–Dec. VERN. *Velbondi*; *Mayál-ki-báji*.

Very extensively grown and used as a pot-herb. The form with white stems is to be seen climbing over native houses in and about villages, where it supplies both shade and food. It is a very wholesome vegetable and makes a good spinach.—DISTRIB. Throughout India, wild or cultivated; Ceylon, Tropical Asia and Africa.

DOUBTFUL GENUS.

CHENOLEA SEDOIDES, Hook. f. Fl. B. I. v. 5 (1886) p. 10. A plant of which there are 2 sheets in Herb. Kew. without flowers has been doubtfully included in the genus *Chenolea* by Sir J. D. Hooker. The locality (Sind) ascribed to the plant rests on somewhat doubtful evidence, and it does not appear to have been found by any of the collectors who have recently worked in Sind. The attention of local botanists is invited.

The following non-indigenous plants not belonging to any of the foregoing genera are grown in gardens:—

Beta vulgaris, Linn. Sp. Pl. (1753) p. 222. *The Beet*, cultivated throughout the Presidency and much used by Europeans as a salad. Fl. B. I. v. 5, p. 5; Grah. Cat. p. 171; Dalz. & Gibs. Suppl. p. 73; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364 & Gard. in Ind. ed. 5, p. 428; Prain, Beng. Pl. p. 879. *Beta maritima*, Watt, Dict. Econ. Prod. v. 1, p. 448.—VERN. *Pálak*.

Spinacia oleracea, Linn. Sp. Pl. (1753) p. 1027. *Spinach*, cultivated in gardens. Native country unknown. Fl. B. I. v. 5, p. 6; Grah. Cat. p. 171; Dalz. & Gibs. Suppl. p. 73; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 364 & Gard. in Ind. ed. 5, p. 429; Prain, Beng. Pl. p. 880; Watt, Dict. Econ. Prod. v. 6, part 3, p. 330.—VERN. *Pálak*.

Boussingaultia baselloides, H. B. & K. Nov. Gen. et Sp. v. 7 (1825) p. 199, t. 645 *bis*. An ornamental climber, a native of S. America, with perennial roots and annual twining stems which produce tubercles by which the plant may be propagated. It has alternate smooth, shining, elliptic leaves and produces during June and July racemes of numerous small white fragrant flowers. The plant thrives well in Poona in a rich soil on a slightly shaded trellis. Woodr. Gard. in Ind. ed. 5, p. 427.

Order CIV. POLYGONACEÆ.

Herbs, rarely shrubs, very rarely trees. Leaves alternate (rarely opposite), entire or serrulate; stipules (ocreæ) scarious or membranous, usually sheathing the stem. Flowers usually small, hermaphrodite (rarely polygamous), regular, solitary or in small bracteate clusters in spike-like inflorescence; pedicels usually articulate. Perianth simple, inferior; lobes or segments 3–6, free or connate, persistent, imbricate in bud. Stamens 5–8 (rarely more or fewer), opposite the perianth-segments; filaments filiform, free or connate below in a ring; anthers 2-celled, usually versatile. Disk annular, glandular or 0. Ovary superior, sessile, free, 1-celled, 2–4-gonous; ovule solitary, orthotropous, sessile or at the end of a distinct funicle; styles 3 or 2 (rarely 4), often short, free or somewhat connate; stigmas capitate, peltate or fimbriate. Fruit a small hard, usually 3 (rarely 4)-gonous or biconvex nut enclosed in the perianth. Seed erect; testa membranous; albumen copious, floury, sometimes ruminate; embryo lateral, straight, curved or sometimes peripheric; radicle superior.—Distrib. Genera 30; species about 600, chiefly in temperate regions.

Perianth 3–5-cleft; stigmas capitellate.
- Shrubs.
  - Stamens 12–18; styles 4 ..... 1. Calligonum.
  - Stamens 8; styles 3 ..... 2. Pteropyrum.
- Herbs (except *Polygonum chinense* which is an under-shrub); stamens 8 or fewer ..... 3. Polygonum.

Perianth 6-cleft, the 3 inner segments much enlarged in fruit; stigmas fimbriate ..... 4. Rumex.

1. CALLIGONUM, Linn.

Rigid, much-branched shrubs. Leaves alternate, narrowly linear or subulate, sometimes very small or almost obsolete; stipules short, membranous. Flowers hermaphrodite, solitary or few, loosely clustered, ocreate; pedicels short; bracteoles 0. Perianth 5-partite; segments flat. Stamens 12–18. Ovary 4-gonous, the angles variously crested, winged, echinate or setose. Seed oblong, terete or 4-gonous; testa thin; embryo central, straight; cotyledons narrow.—Distrib. Species 26, in dry or sandy regions of N. Africa, Western or Central Asia.

1. **Calligonum polygonoides**, *Linn. Sp. Pl.* (1753) p. 530. An almost leafless shrub; branches terete, pale, glabrous, the internodes 1–1½ in. long; flowering branchlets slender; stipules short, membranous, cup-shaped, obliquely truncate and produced upwards at one side. Flowers pinkish, fascicled in the axils of the ocreæ; pedicels $\frac{1}{16}$–$\frac{1}{10}$ in. long. Perianth about $\frac{1}{8}$ in. long, divided about $\frac{2}{3}$ the way

down; segments obovate, cuneate. Ovary tuberculate; styles 4, slightly connate at the base; stigmas capitate. Nucleus of the fruit $\frac{1}{4}$–$\frac{1}{3}$ in. long, oblong, densely clothed with numerous branched reddish-brown bristles dilated at the base. Fl. B. I. v. 5, p. 22; Talb. Trees, Bomb. ed. 2, p. 276; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Watt, Dict. Econ. Prod. v. 2, p. 27.—Flowers: Apr.-May.

In the Bombay Presidency confined to Sind. SIND: *Stocks*!, *Woodrow*; Boogta hills, *Vicary*!—DISTRIB. India (Panjáb, Rajputana); Persia, Armenia, Syria.

2. **PTEROPYRUM,** Jaub. & Spach.

Rigid shrubs with twiggy branches. Leaves small, alternate or fascicled, linear or spathulate; stipules very short or obsolete. Flowers small, hermaphrodite, ocreate; pedicels filiform; bracteoles 0. Perianth 5-partite; segments subequal. Stamens 8; filaments filiform, attached to a pilose ring; anthers oblong. Ovary 3-gonous, acuminate; styles 3; stigmas capitate. Nut broadly 3-winged, beaked. Seed beaked, base broad; embryo eccentric, slightly curved; cotyledons oblong, much shorter than the radicle.—DISTRIB. Western Asia; species 5 or 6.

1. **Pteropyrum Oliverii,** *Jaub. & Spach, Illustr. Pl. Orient.* v. 2 (1844) p. 9, t. 108. A much-branched glabrous shrub; branches twiggy with white bark. Leaves $\frac{1}{4}$–$\frac{5}{8}$ by $\frac{1}{10}$–$\frac{1}{6}$ in., spathulate-oblong, entire, fascicled, nerveless, the young ones often with revolute margins; petioles short, filiform; stipules thinly membranous, appressed to the branch, truncate, produced at one or both sides into a triangular appendage. Flowers in many-flowered fascicles; pedicels filiform, articulated below the middle. Perianth pink-colored; segments connate at the base into a short tube, the 3 inner segments the largest, obovate-oblong. Stamens 8, of which the 5 shorter are alternate with the perianth-segments, the other 3 opposite the larger inner segments; filaments inserted on a hairy ring; anthers oblong, versatile. Fruit 3-winged, but appearing to be 6-winged owing to the twist received at the neck by which the upper halves of the wings become alternate with the lower. Fl. B. I. v. 5, p. 23; Wight, Icon. t. 1809; Talb. Trees, Bomb. ed. 2, p. 276; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365. *Atraphaxis sp.*, Aitch. Pb. & Sind Pl. p. 125. *Gibsonia conferta*, Stocks, MS.—Flowers: Oct.

SIND: *Vicary*!, *Stocks*!; Laki, *Woodrow*.—DISTRIB. Persia, Afghanistan.

3. **POLYGONUM,** Linn.

Herbs (rarely shrubs), usually erect. Leaves alternate; stipules membranous, connate into a tubular ocrea. Flowers hermaphrodite, small or minute, axillary or terminal, the clusters sessile or in spiciform capitate or panicled racemes; pedicels short, usually jointed under the perianth; bracts and bracteoles membranous, ocreate. Perianth green or colored, 4–5 (rarely 3)-cleft. Stamens 5–8 (rarely 1–4), perigynous; filaments filiform, often dilated at the base, or alternate with the lobes of an annular or glandular disk; anthers 2-celled, the cells distinct, joined by a small connective. Ovary compressed or 3-gonous; ovule solitary, usually stipitate; styles 2 or 3, free or slightly connate below;

stigma capitate. Fruit a compressed or 3-gonous nutlet with obtuse or acute angles, covered or nearly covered by the persistent perianth; pericarp usually hard, shining or dull. Seed albuminous; embryo lateral or eccentric; radicle long; cotyledons usually small.—DISTRIB. Throughout the world; species about 150.

Inflorescence axillary; flowers solitary or in small clusters.	
An erect branched undershrub	1. *P. salicornioides.*
A diffusely-branched prostrate herb	2. *P. plebejum.*
Inflorescence terminal, racemose, spicate or capitate.	
Inflorescence of sessile or pedicellate flowers in branched spikes or spike-like racemes.	
Racemes stout, compact; bracts closely imbricate.	
Nutlets orbicular or biconvex.	
Stipules and bracts eciliate; whole plant glabrous.	3. *P. glabrum.*
Stipules and bracts ciliate; peduncles strigosely hairy.	
Stipules with a spreading or recurved scabrid limb	4. *P. limbatum.*
Stipules without a limb	5. *P. tomentosum.*
Nutlets distinctly trigonous	6. *P. serrulatum.*
Racemes slender, lax; bracts more or less interrupted.	
Perianth and whole plant glandular	7. *P. Hydropiper* var. *glandulosissima.*
Perianth eglandular	8. *P. mite.*
Inflorescence compressed, capitate.	
Every or almost every head in the axil of an involucral leaf	9. *P. alatum.*
Heads not in the axils of involucral leaves.	
A climbing unarmed undershrub; leaves broadly ovate	10. *P. chinense* var. *ovalifolia.*
Erect herbs, more or less armed with minute prickles.	
Angles of stem prickly; leaves ¼–½ in. broad; bracts glabrous	11. *P. pedunculare* var. *angustissima.*
Angles of stem almost without prickles; leaves ¾–1 in. broad; bracts subciliate	11. *P. pedunculare* var. *nilagirica.*

1. **Polygonum salicornioides,** *Jaub. & Spach, Illustr. Pl. Orient.* v. 2 (1844–46) p. 33, t. 123. A low erect branched undershrub; stem and branches pale, terete, striate, minutely scabrid along the ridges between the striæ. Leaves sessile, very deciduous, small, the lower ovate or oblong-lanceolate, becoming gradually smaller and subulate upwards, the uppermost minute; stipules membranous, produced into 2 triangular acute lobes. Fruit arising from the upper axils, shortly pedicellate, solitary or 2–3, erect in flowering; pedicels thick, articulated below the perianth. Perianth rosy, 5-partite, the 2 outer segments concave, slightly keeled on the back, shorter and slightly narrower than the inner, the 3 inner segments flat. Stamens 8; anthers minute. Fruit not seen. Fl. B. I. v. 5, p. 26; Meissn. in DC. Prodr. v. 14, p. 90.

SIND: *Vicary!*

There is but one sheet in Herb. Kew. ticketed as above. The specimens on it are very imperfect.—DISTRIB. Persia.

2. **Polygonum plebejum,** *R. Br. Prodr.* (1810) p. 420. A diffusely-branched, prostrate herb, often with a woody rootstock; branches

terete, striate. Leaves $\frac{1}{6}$–$\frac{2}{3}$ in. long, oblong, or linear, or obovate, sessile or shortly petiolate; stipules hyaline, short, lacerate to the middle, fimbriate. Flowers pink, axillary, solitary or 2–3 together; pedicels short or 0. Perianth $\frac{1}{10}$ in. long or less, divided nearly to the base; segments broad or narrow or the 2 outer (or all?) acute. Nuts 3-gonous, smooth, shining, $\frac{1}{25}$–$\frac{1}{10}$ in. long. Fl. B. I. v. 5, p. 27; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 884.—Flowers: Dec.-Mar.

A polymorphous plant of which there are several forms, many of which seem to be the result of soil and climate. Sir J. D. Hooker (Fl. B. I. l. c.) gives 11 forms or varieties, though he says that there is not one of these that does not seem to pass insensibly into 2 or more others. The shape of the sepals, which is relied on to furnish distinguishing characters for some of the varieties, is, Sir J. D. Hooker (*l. c.*) remarks, "so variable in age in other species that much importance must not be attached to it." A wet season or moist locality has a tendency to produce luxuriant plants with long internodes and large leaves, while a dry season or locality has the opposite tendency. The only apparent way of settling the question as to how far soil and climate affect the growth of the plant, would be to grow the plant under varying conditions. An experiment of this kind might be undertaken by one of the Botanic Gardens in India.

Of the varieties given by Sir J. D. Hooker in the 'Flora of B. India,' the following are those most commonly met with in the Bombay Presidency:—

Var. 1. *P. plebejum proper*, Hook. f. Fl. B. I. v. 5, p. 28. Leaves $\frac{1}{6}$–$\frac{1}{3}$ in. long; flowers usually hidden among the stipules; sepals all obtuse, short and broad. Prain, Beng. Pl. p. 884.

Siddapur (N. Kanara), *Talbot*, 1080, ex *Gage*, Census Indian Polygonums.

Var. 2. *effusa*, Hook. f. Fl. B. I. v. 5, p. 28. Leaves narrowly linear; flowers all or mostly pedicellate; sepals all obtuse, short and broad. A weed of wet places. Prain, Beng. Pl. p. 884. *Polygonum effusum*, Meissn. in DC. Prodr. v. 14, p. 93.

Sind: *Dalzell*!, *Stocks*, 30!; Karachi, *Cooke*!, *Kanitkar*!; Hyderabad, *Cooke*!

Var. 3. *sindica*, Hook. f. Fl. B. I. v. 5, p. 29. Branches pale red-brown; leaves $\frac{1}{10}$–$\frac{1}{8}$ in. long, elliptic-oblong; flowers very minute, sunk among the stipules; sepals narrow, obtuse.

Sind: *Stocks*!
There is but 1 sheet in Herb. Kew. marked as above.

Var. 4. *indica*, Hook. f. Fl. B. I. v. 5, p. 28. Branches uniformly spreading all round the crown; leaves $\frac{1}{4}$–$\frac{2}{3}$ in. long, linear or obovate-oblong, flat, often apiculate; sepals broad, the 2 outer acute. Watt, Dict. Econ. Prod. v. 6, part 1, p. 319. *Polygonum indicum*, Heyne, in Roth, Nov. Pl. Sp. p. 208; Wight, Icon. t. 1808. *P. elegans*, Dalz. & Gibs. p. 214 (*not* of Roxb.).

The commonest form. Konkan: *Law*! Deccan: Mahableshwar, *Cooke*!; Karli, *Cooke*! S. M. Country: Belgaum, *Ritchie*, 1311!; Badami, *Cooke*!, *Woodrow*!, *Bhiva*! Kanara: N. Kanara, *Talbot*, 57, ex *Gage*, Census Indian Polygonums.

Var. 5. *brevifolia*, Hook. f. Fl. B. I. v. 5, p. 28. Leaves small, $\frac{1}{8}$–$\frac{1}{4}$ in. or less, obovate, acute or apiculate; internodes very short, concealed by the leaves and stipules, which latter show as a white villous band on the underside of the branchlets; 2 outer sepals acute. Prain, Beng. Pl. p. 884.

Konkan: *Stocks*!, *Dalzell*!; Atgaon, Thana districts, *Kanitkar*! Deccan: Poona, *Kanitkar*! Sind: *Dalzell*!

Var. 6. *Griffithii*, Hook. f. Fl. B. I. v. 5, p. 29. Branches excessively numerous from the root, very slender, quite naked below; leaves orbicular, $\frac{1}{10}$–$\frac{1}{8}$ in. in diam., apiculate, with a distinct median ridge; stipules very crinite and woolly-looking; flowers minute, hidden among the stipules; sepals rounded, the 2 outer apiculate.

Konkan: *Stocks*! ex *Gage*, Census of Indian Polygonums.
Sir J. D. Hooker considers this a probable form of *brevifolia*, with the bases of the branches buried in the soil, and hence leafless and very slender.

Var. 7. *polyneura*, Hook. f. Fl. B. I. v. 5, p. 29. Leaves $\frac{1}{3}$ in. long, linear-oblong, acute; stipules many-nerved; flowers 1–2 in the axils, shortly pedicellate; nut polished, smooth.

Kanara: Sirsi (N. Kanara), *Talbot*, 389, ex *Gage*, Census of Indian Polygonums.

Var. 8. *micranthema*, Hook. f. Fl. B. I. v. 5, p. 29. Small; branches very slender; leaves $\frac{1}{4}$–$\frac{1}{3}$ in. long, linear or linear-oblong, obtuse; flowers pedicellate, very minute; sepals narrow; nutlets very small, $\frac{1}{40}$–$\frac{1}{20}$ in. long. Prain, Beng. Pl. p. 884. *Polygonum micranthemum*, Franchett, MSS. Considered by Sir J. D. Hooker to be only a small state of *P. plebejum*.

Sind: Karachi district, *Ryan*, ex *Gage*, Census of Indian Polygonums.

3. **Polygonum glabrum,** *Willd. Sp. Pl.* v. 2 (1799) p. 447. Stems 2–5 ft., stout, simple or slightly branched, procumbent and usually reddish below, then erect, the young stems usually green, polished, with a dark reddish-brown ring at each node. Leaves 3–9 by $\frac{5}{8}$–$1\frac{1}{4}$ in., lanceolate, finely acuminate, glabrous, closely gland-dotted, tapering at the base; lateral nerves numerous, close, slender; petioles $\frac{1}{8}$–$\frac{1}{2}$ in. long, those of the young leaves usually red; stipules $\frac{7}{8}$–$1\frac{1}{4}$ in. long, those on the old stems torn and ragged, when young completely and closely sheathing the stem, conspicuously veined, the mouth truncate not ciliate. Flowers pink, in paniculate slender racemes; peduncles usually glabrous; pedicels short; bracts $\frac{1}{6}$ in. long, ovate, obtuse, with membranous not ciliate margins, few-flowered. Perianth $\frac{1}{8}$–$\frac{1}{5}$ in. long; segments oblong, obtuse. Stamens 6–8 (often 7). Styles 2, connate at the base, the free portions $\frac{1}{16}$ in. long, filiform. Nutlets $\frac{1}{8}$ in. in diam., broadly ovoid or suborbicular, compressed, biconvex, black, shining. Fl. B. I. v. 5, p. 34; Grah. Cat. p. 172; Dalz. & Gibs. p. 214; Wight, Icon. t. 1799; Trim. Fl. Ceyl. v. 3, p. 412; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 884; Watt, Dict. Econ. Prod. v. 6, part 1, p. 318.—Flowers: Oct.–Mar. Vern. *Sheral.*

Dalzell without locality in Herb. Kew.! Konkan: *Law*!; margins of tanks, *Graham*; Pen, *Kanitkar*! Deccan: Vale of the Yenna at Mahableshwar, *Graham*; Mahableshwar near the lake, *Cooke*!, *H. M. Birdwood*; Poona, *Cooke*! Kanara: Vincholi on the Kála naddi, *Talbot*, 941, ex *Gage*, Census of Indian Polygonums.

SIND: *Stocks*!, *Dalzell*, 1202, ex *Gage*, Census of Indian Polygonums.—DISTRIB. Throughout India; Ceylon, Australasia, China, Africa, America.

4. **Polygonum limbatum,** *Meissn. in DC. Prodr.* v. 14 (1856) p. 123. Stem stout, erect, simple, pubescent or glabrous. Leaves 4–8 by 1–1½ in., lanceolate, acuminate, scaberulous on both surfaces, base tapering; petioles short; stipules cylindric, strigose, the mouth truncate with a herbaceous spreading or recurved scabrid ciliate limb. Flowers in short erect paniculate racemes; peduncles strigose; pedicels short. Inflorescence and nuts as in *P. tomentosum*, from which it differs in the leaves, which are minutely scabrid, and in the stipules, which have a herbaceous scabrid limb. Fl. B. I. v. 5, p. 30; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 884.

Rare. KONKAN: *Law*!, *Stocks* ex *Gage*, Census Indian Polygonums.
There is but 1 sheet in Herb. Kew. ticketed "Konkan, Law." I have seen no others.—DISTRIB. India (Bengal, Upper Gangetic plain, Garwhal); Egypt, Tropical Africa.

5. **Polygonum tomentosum,** *Willd. Sp. Pl.* v. 2 (1799) p. 447. Stems one or more from a prostrate annual stock, 2–4 ft. long, often as thick as the finger, pubescent or glabrous. Leaves 4–8 by 1–1½ in., lanceolate, finely acuminate, silky-pubescent on both sides, rarely glabrate, base tapering; petioles ¼–⅜ in. long; stipules ½–1 in. long, membranous, hairy, the mouth truncate, erect, ciliate with rigid bristles ¼ in. long. Flowers white, in paniculate spike-like racemes 1½–3 in. long; peduncles strigosely hairy; pedicels $\frac{1}{10}$–⅛ in. long; bracts ⅛ in. long, nearly as broad as long, 6–8-flowered, orbicular, hispid, ciliate with long bristles; bracteoles small, lanceolate, membranous. Perianth ⅙–⅕ in. long, divided about ⅔ the way down; segments 5, ovate-oblong, obtuse. Stamens 7–8. Styles 2, recurved. Nuts ⅛ in. in diam., orbicular, compressed, with rounded margins and convex faces. Fl. B. I. v. 5, p. 30; Trim. Fl. Ceyl. v. 3, p. 411; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 884.—Flowers: Nov.–May.

KANARA: Halyál, *Ritchie*, 1143!; Yellur, *Ritchie*, 1143!; Sirsi Road, *Raoji*!; Birchi, *Talbot*, 2051, ex *Gage*, Census of Indian Polygonums; Kumpta, *Woodrow*!—DISTRIB. India (Bengal, Assam, Cachar, W. Peninsula); Ceylon, Java, Philippines, Tropical and S. Africa.

6. **Polygonum serrulatum,** *Lagasca, Gen. & Sp. Pl.* (1816) p. 14. Stems 2–4 ft. high, slender, glabrous, often reddish. Leaves subsessile, drying green, 3–5 by ⅜–⅝ in., linear, acute, glabrous or sometimes with a few scattered hairs on the upper side and the midrib, the margins usually ciliate with short hairs which are closely appressed to the edge, base slightly tapering, rounded; stipules reaching 1½ in. long, strigose, the mouth truncate and ciliate with long stiff bristles which are nearly as long as the tube. Flowers in paniculate slender erect racemes ¾–2 in. long; peduncles glabrous; pedicels short; bracts membranous, glabrous, strongly (sometimes squarrosely) ciliate with long hairs, the margins somewhat rose-colored. Perianth white, $\frac{1}{10}$ in. long, eglandular; segments ovate. Stamens 5–8. Styles 3, connate at the base, the free portion filiform. Nutlets $\frac{1}{12}$ in. long, trigonous, smooth, and polished. Fl. B. I. v. 5, p. 38; Trim. Fl. Ceyl. v. 3, p. 413; Prain, Beng. Pl. p. 885. *Polygonum rivulare*, Grah. Cat. p. 172 (doubtfully of Kœn.); Dalz. & Gibs. p. 214. *P. barbatum*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365 (*not* of Linn.).—Flowers: Mar. VERN. *Dákta Sheral.*

Distinguished from *P. barbatum*, Linn., by the bristles of the stipules which are shorter, those of *P. barbatum* being longer than the tube, by the leaves which dry green, those of *P. barbatum* drying brown, and by the shape of the base of the leaves, which are acute in *P. barbatum*, usually rounded in *P. serrulatum*.

DECCAN: Mahableshwar, *Cooke*!, *H. M. Birdwood*. S. M. COUNTRY: Adur (Dharwar Collectorate), *Woodrow*! KANARA: *Talbot*, 3140, ex *Gage*, Census Ind. Polyg.—DISTRIB. India (Upper Gangetic plain, N.W. Himalaya, Assam, Birma, W. Peninsula); Ceylon, Malay Peninsula, China.

7. **Polygonum Hydropiper,** *Linn.* VAR. **glandulosissima,** *Gage, in Census Ind. Polyg. in Rec. Bot. Survey of India*, v. 2 (1903) p. 401. A glabrous annual 12–18 in. high, covered everywhere with minute glands; stem erect or ascending, branched. Leaves subsessile or shortly petiolate, lanceolate or oblong-lanceolate, rarely more than 3 in. long, variable in width; stipules glabrous, not ciliate. Flowers in filiform interrupted decurved racemes; bracts glabrous, glandular. Perianth pink, very glandular. Nutlets trigonous, opaque, granulate.

S. M. COUNTRY: near Hubli (Dharwar district), from Poona College of Science ex *Gage*, l. c. KANARA: N. Kanara, *Talbot*, 2682, ex *Gage*, l. c.

I have not seen the specimens referred to which were sent from the College of Science at Poona, of which I was for many years Principal.

8. **Polygonum mite,** *Schrank, Fl. Baier.* v. 1 (1789) p. 668. A slender annual reaching 2 ft. high; stems reddish, grooved, glabrous. Leaves subsessile, 1–3 by $\frac{1}{4}$–$\frac{1}{2}$ in., linear-oblong or linear-lanceolate, acute, glabrous or with a few hairs on the nerves, the margins very minutely ciliolate; stipules $\frac{1}{2}$–$\frac{5}{8}$ in. long, the tube clothed with closely appressed hairs sunk in the tissue, ciliate with stiff hairs which are shorter than the tube. Racemes $\frac{3}{4}$–1 in. long; peduncles long, glabrous; bracts $\frac{1}{10}$ by $\frac{1}{12}$ in., eglandular, glabrous, ciliate. Perianth $\frac{1}{10}$ in. long, eglandular; segments ovate-oblong, obtuse, pink. Nutlets ovoid, compressed, biconvex, shining, black, $\frac{1}{12}$ by $\frac{1}{16}$ in.

DECCAN: Mahableshwar, near the lake above the Chinamen's gardens, *Cooke*!

Probably introduced among imported seeds. Seeds and plants from Europe have been constantly distributed to the cultivators below the lake at Mahableshwar.—DISTRIB. India (Bengal, N.W. Himalaya); West Asia, Europe.

9. **Polygonum alatum,** *Buch.-Ham. in Don, Prodr. Fl. Nep.* (1825) p. 72. Annual; stems numerous, 1–2 ft. long, usually prostrate with many ascending branches, glabrous, grooved, rooting at the lower nodes. Leaves $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{2}$–1 in., deltoid-ovate, acute or subobtuse, entire, minutely punctate, base subtruncate or subcordate, shortly cuneate; petioles $\frac{1}{4}$–$\frac{3}{8}$ in. long, winged, amplexicaul at the base; stipules membranous, obliquely truncate, acute, not ciliate but with a tuft of hairs at the base. Flowers in pedunculate heads with an involucral leaf at the base of each; peduncles glandular-hairy at the apex below the head; bracts $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovate-oblong, membranous, not ciliate. Perianth $\frac{1}{8}$ in. long, 4-fid; lobes about $\frac{1}{20}$ in. long. Stamens 6–8, included. Nutlets $\frac{1}{12}$ in. long and nearly as broad, broadly ovoid, compressed, biconvex, minutely pitted in regular series, black. Fl. B. I. v. 5, p. 41; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 365; Prain, Beng. Pl. p. 885; Watt, Dict. Econ. Prod. v. 6, part 1, p. 317. *Polygonum punctatum*, Buch.-Ham. in Don, Prodr. Fl. Nep. (1825) p. 72; Trim. Fl.

Ceyl. v. 3, p. 413. *P. nepalense*, Meissn. Monog. (1826) p. 84; Wight, Icon. t. 1804.—Flowers: Aug.–Nov.

This is the var. *nepalensis* of Hook. f. Fl. B. I. v. 5, p. 42, which Captain Gage (Census Ind. Polyg. p. 495) says he cannot recognize from the specimens in the Calcutta Herbarium as distinct from *P. alatum proper*. The plant ought perhaps to have been called *Polygonum punctatum*, Buch.-Ham., as the specific name *punctatum* is really prior to that of *alatum*, though both occur on the same page of Don's Prodr. Fl. Nep. Otto Kuntze has adopted the specific name *punctatum* as also Trimen in his Fl. Ceyl. l. c.

Deccan: Mahableshwar, abundant, *Cooke*!, *H. M. Birdwood*.—Distrib. Throughout India; Ceylon, Afghanistan, Africa, China.

10. **Polygonum chinense,** *Linn. Sp. Pl.* (1753) p. 363. Var. **ovalifolia,** *Meissn. in Wall. Pl. As. Rar.* v. 3 (1832) p. 60. A large rambling undershrub, semi-scandent over bushes by its long divaricate branches; stems cylindric, glabrous, striate, the older ones dark-brown, the younger red. Leaves 1½–4 by ¾–2½ in., elliptic or ovate, shortly acuminate, glabrous above, paler and with short stiff hairs on the nerves beneath, the margins entire or crenulate, often red, base usually truncate and sometimes very shortly cuneate (rarely acute, rounded or subcordate); petioles ¼–½ in. long, enlarged and auricled at the base, glandular-hairy; stipules very long, reaching sometimes 1¾ in., membranous, very obliquely truncate, lanceolate, acute, often much split and torn in age. Flowers sessile, in cymosely paniculate heads, white, slightly fragrant; peduncles glandular-hairy; bracts ovate, acute, sometimes glandular near the base. Perianth ¼ in. long, divided about ½-way down; lobes 5, ovate-oblong, subobtuse. Ovary 3-gonous; styles 3, connate at the base, divaricate. Nutlets ⅙–⅕ by ⅛ in., trigonous, black. Fl. B. I. v. 5, p. 45. *Polygonum chinense*, Grah. Cat. p. 172; Dalz. & Gibs. p. 214; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366.—Flowers: Nov.–Apr. Vern. *Nárali*; *Paral*.

Dalzell without locality in Herb. Kew.! Deccan: hills about Pár, *Graham*; Mahableshwar, common, *Graham*, *Cooke*!, *H. M. Birdwood*; Panchgani, *Bhiva*! S. M. Country: Rámghát, *Ritchie*, 655!—Distrib. India (W. Peninsula, N.W. & E. Himalaya, Nepal, Assam, Birma); Malay Peninsula.

11. **Polygonum pedunculare,** *Wall. Cat.* (1828) 1718. Var. **angustissima,** *Hook. f. Fl. B. I.* v. 5 (1886) p. 48. A slender erect annual; stems grooved, sparsely armed with minute recurved prickles on the angles, otherwise smooth. Leaves 2½–4 by ¼–½ in., linear-lanceolate, acute, glabrous, with slightly ciliolate or scabrid margins, base acute; petioles ⅛–½ in. long; stipules ¾ in. long, membranous, tubular, obliquely truncate, the mouth lanceolate. Flowers in short oblong cymosely paniculate heads; peduncles slender, glandular-hairy; bracts ovate, acuminate, membranous, glabrous. Perianth 1/10–⅛ in. long, pink or white, divided about ½-way down; lobes elliptic-oblong, obtuse. Stamens 5 with 5 intermediate scales. Ovary compressed; styles 2, connate below. Nutlets orbicular, compressed, 1/12 in. long and as broad as long, biconvex. Wight, Icon, t. 1802, A; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366.—Flowers: Oct.–Dec.

Konkan: near Ratnagiri, *Woodrow*! Deccan: Mahableshwar, *Cooke*!, *Woodrow*! S. M. Country: near Belgaum, *Ritchie*, 1144! Kanara: Jagalbet watercourse on the Kála naddi, *Ritchie*, 1144!—Distrib. India (Bengal, W. Peninsula).

Var. *nilagirica*, Hook. f. Fl. B. I. v. 5 (1886) p. 48. Stems glabrous,

almost without prickles except a few below the stipules. Leaves 3–4¾ by ¾–1 in., oblong-lanceolate, acute, tapering at the base; petioles ¼–¾ in. long, often with minute prickles which sometimes extend along the midrib beneath. Bracts lanceolate, subciliate. *Polygonum nilagiricum* (sp.), C. B. Clarke, MSS. in Herb. Kew.

KANARA: Supa (N. Kanara), *Talbot*, 1383, ex Gage, Census Ind. Polyg.—DISTRIB. India (W. Peninsula).

4. **RUMEX,** Linn.

Perennial or annual herbs (rarely shrubs). Leaves mostly radical or cauline, alternate; stipules hyaline, ocreate, often disappearing in age. Flowers hermaphrodite or monœcious, in axillary clusters or in whorls, arranged in simple or panicled racemes; pedicels jointed; bracts ocreate; bracteoles 0. Perianth-segments 6 (rarely 4), the inner accrescent, entire or toothed; the midrib or disk often enlarged or tuberculate. Stamens 6; filaments short; anthers oblong. Ovary 3-gonous; ovule solitary; styles 3; stigmas fimbriate. Fruit a small nut enclosed in the usually enlarged inner perianth-segments, the angles acute. Seed erect; embryo lateral, nearly straight; cotyledons linear or oblong.—DISTRIB. All temperate and some tropical countries; species about 140.

1. **Rumex dentatus,** *Linn. Mantiss.* 2 (1771) p. 226. An erect annual 1–2 ft. high; stems usually red, grooved, glabrous. Leaves 3–4 by 1–1¼ in., oblong, obtuse, glabrous, the petioles of the radical leaves reaching 2½ in. long, base rounded or cordate. Flowers pedicellate, in distinct whorls which are leafy or not. Perianth ⅛–⅕ in. long; inner segments broadly ovate, much enlarged in fruit, reticulately veined, with an ovoid-oblong smooth tubercle at back and irregularly toothed or pectinate margins, the teeth numerous, straight, not hooked. Nut ⅒ by $\frac{1}{16}$ in., acutely trigonous (almost winged). Fl. B. I. v. 5, p. 59; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366; Prain, Beng. Pl. p. 888.—Flowers: Sept.–Nov.

KONKAN: *Stocks.* S. M. COUNTRY: South of Belgaum, *Ritchie*, 1142! SIND: *Stocks*!—DISTRIB. India (Bengal, Assam, W. Peninsula).

Rumex vesicarius, Linn. Sp. Pl. (1753) p. 336. Annual, erect, glabrous, 6–12 in. high, branched from the root. Leaves 1–3 in. long, elliptic, ovate, or oblong, 3–5-nerved, base cuneate, cordate or hastate. Flowers monœcious; inner perianth-segments membranous and reticulate in fruit, orbicular. Fl. B. I. v. 5, p. 61; Grah. Cat. p. 172; Duthie, Field & Garden Crops, part 3, p. 45; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366; Prain, Beng. Pl. p. 888; Watt, Dict. Econ. Prod. v. 6, part 1, p. 592.—VERN. *Chuka.*

Cultivated as a vegetable and for its medicinal properties, known sometimes as the *Bladder Dock.* It is said to be indigenous in the Western Panjáb. The leaves, seeds, and roots are employed in native medicine.

The following plants not belonging to any of the foregoing genera are sometimes grown:—

Fagopyrum esculentum, Mœnch. Method. (1794) p. 290. An erect glabrous annual with broadly ovate, cordate, acuminate leaves and pink or white flowers in axillary and terminal cymes. Nut trigonous with acute angles, light-brown, polished. *The Buckwheat*, occasionally grown

in fields in the Deccan and Gujarat. Fl. B. I. v. 5, p. 55; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366; Watt, Dict. Econ. Prod. v. 3, p. 310.—Flowers: Jan. VERN. *Kuthu.*

The grain is eaten by Brahmins on fast days.

Antigonon leptopus, Hook. & Arn. Bot. Beech. Voy. (1841) p. 308, t. 69. A large climber, a native of S. America, with cordate or deltoid leaves with stem-clasping petioles, and large panicles of showy pink flowers.

The plant is of easy culture and is largely grown in gardens. Woodr. Gard. in Ind. ed. 5, p. 430; Prain, Beng. Pl. p. 889.—Flowers: Aug.–Nov.

Muehlenbeckia platyclados, Meissn. in Bot. Zeit. v. 23 (1865) p. 313. A curious glabrous shrubby erect plant, a native of the Solomon Islands east of New Guinea, is occasionally grown in gardens. It has smooth flattened finely striate leaf-like branches and small flowers in lateral fascicles. *Coccoloba platyclada*, F. Muell. in Bot. Mag. v. 19 (1863) t. 5382.

ORDER CV. PODOSTEMONACEÆ.

Aquatic herbs usually annual, submerged and closely attached to rocks, flowering when exposed by the fall of the water-level. Primary axis various, early giving rise to a thallus. Leaves more or less distichous, simple, usually sheathing. Flowers hermaphrodite, small, regular and 3-merous with perianth; or zygomorphic and 2-merous without perianth, hypogynous. Perianth when present 3-lobed; lobes imbricate, marcescent. Aclamydeous flowers included before opening in a closed spathe which opens irregularly at the tip or by a slit on the upper side. Stamens hypogynous; in regular flowers 3, alternate with the perianth-segments; in zygomorphic flowers usually 2, monadelphous on the lower side of the flower, the common stalk usually much exceeding the partial filaments; staminodes in zygomatic flowers usually 2; anthers introrse, 2-celled. Ovary superior, 2–3-celled, with thick placenta and delicate septa; ovules numerous, anatropous; stigmas 2–3. Capsule usually pedicellate, ribbed or smooth, septifragal. Seeds numerous, minute; testa mucilaginous; albumen 0; embryo straight.—DISTRIB. Genera about 20; species about 120, chiefly tropical.

Flowers regular; perianth-segments 3; stamens 3; ovary 3-celled	1. LAWIA.
Flowers zygomorphic; perianth 0; stamens 1–3; ovary 2-celled.	
Spathe erect, splitting irregularly at the tip	2. GRIFFITHELLA.
Spathe more or less prostrate, splitting along the upper side	3. HYDROBRYUM.

An Order but little investigated till recently. Its members are, some of them, very abundant in the Ghát streams in the Western Peninsula of India, but, owing to their fragile nature, dried herbarium specimens are rarely of much value. Mr. Willis, the Director of the Royal Botanic Gardens at Peradeniya, Ceylon, has spent much time and labor in the study of the Indian and Ceylon species, the result of which he has published in the Annals of the Royal Gardens at Peradeniya. Mr. Willis has had the opportunity of studying these plants in a living condition, which, as he has explained in his memoir, is the only satisfactory way of arriving at any useful result. I have followed Mr. Willis entirely as regards the Bombay species, but I have little doubt that more species than those I have dealt with are to be found in the streams of the Deccan and Konkan hills, and the ravines at Mahableshwar immediately after the rains would be a likely hunting-ground for future Indian botanists.

1. **LAWIA,** Griff.

Herbs growing on smooth rocks in rapids and waterfalls. Thallus closely attached to the rock, frondose, branched, rootless. Leaves usually in rosettes on the upper surface of the thallus, very numerous, simple, entire, usually acute, green or red with whitish median line, easily detached and broken. Flowers numerous at the apices of the lobes of the thallus (rarely on the upper surface), solitary, on pedicels emerging from terminal axial leafy *cupules*. Perianth 3-fid, regular, imbricate, membranous, brownish, marcescent. Stamens 3, hypogynous, alternating with the perianth-segments; anthers 2-celled, opening longitudinally. Ovary superior, ellipsoid, obtuse, more or less 3-angled, 3-celled; ovules numerous, anatropous, with a thick axile placenta; septa very thin; stigmas 3. Capsule more or less enclosed in the persistent perianth, ellipsoid or obovoid, 9-ribbed, 3-celled, septifragal; valves 3, equal, opposite the perianth-segments, incurved after dehiscence. Seeds numerous, minute; outer layer of testa sticky when wetted; cotyledons crumpled. — DISTRIB. Species 1, S. India and Ceylon.

It is scarcely necessary to make any apology for restoring the original name of this genus, which was so named in honour of Mr. Law of the Bombay Civil Service, whose labors in the cause of botanical science are well known. The name *Lawia* was given to the genus by Tulasne from Griffith's manuscript and first published by him in 1849 (Ann. Sc. Nat. sér. 3, v. 11, p. 112). In his Monogr. Podost. (1852) p. 189, as the generic name *Lawia* had been already given to a Rubiaceous genus by Wight in 1847, Tulasne substituted the name *Terniola* for *Lawia*. Wight's *Lawia* has been since reduced to *Adenosachme*, so that there can be no reason why the original name should not be restored. Warming, Trimen, Willis, &c. have adopted it.

1. **Lawia zeylanica,** *Tulasne, in Ann. Sc. Nat.* sér. 3, v. 11 (1849) p. 112; Trim. Fl. Ceyl. v. 3, p. 416; Willis, Rev. Podost. Ind. & Ceyl. in Ann. Roy. Gard. Peradeniya, p. 213. *Lawia pulchella*, Tul. l. c. p. 113. *L. longipes*, Tul. l. c. p. 113. *Tulasnea* all species *ramosissima* excepted, Wight, Icon. tt. 1919, 1920. *Dalzellia* all species *ramosissima* excepted, Wight, Icon. v. 5, part 2, p. 35. *Terniola zeylanica*, Tul. Monogr. Podost. (1852) p. 190, t. 13, fig. 3; Hook. f. Fl. B. I. v. 5, p. 62. *T. pulchella*, Tul. Monogr. Podost. p. 192; Dalz. & Gibs. p. 245; Fl. B. I. v. 5, p. 62; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366. *T. Lawii*, Dalz. & Gibs. Bo. Fl. (1861) p. 245; Wedd. in DC. Prodr. v. 17 (1873) p. 47; Fl. B. I. v. 5, p. 63; Woodr. l. c. *T. longipes*, Tul. Monogr. Podost. p. 193, t. 13, fig. 2; Dalz. & Gibs. l. c.; Fl. B. I. v. 5, p. 63; Woodr. l. c. *T. pedunculosa*, Dalz. & Gibs. l. c.; Wedd. l. c.; Fl. B. I. l. c.; Woodr. l. c. *T. foliosa*, Dalz. & Gibs. l. c.; Wedd. l. c.; Fl. B. I. l. c.; Woodr. l. c.

VAR. 1. *malabarica*, Willis, l. c. p. 215. Thallus frondiform, 6 in. or more in diam., with frequent branching and ribbon-like or flabelliform lobes, thick and hard. Leaves $\frac{1}{3}$–$\frac{1}{2}$ in. long or more, linear. Flowers numerous, closely crowded along the edges of the thallus emerging from short cupules; fruiting pedicels variable, averaging about $\frac{1}{3}$ in. long. Fruit obovoid or ellipsoid, $\frac{1}{2.5}$–$\frac{1}{12}$ in. long with thin ribs and marked depressions between the carpels. Seeds yellowish-brown.

KANARA: on the Kála naddi.

VAR. 2. *konkanica*, Willis, l. c. p. 216. Thallus 6–10 in. in diam. with flabelliform lobes and crowded growing points. Leaves $\frac{1}{4}$–$\frac{2}{3}$ in. long. Cupules short or long, often leafy when young. Flowers often nodding in bud. Fruiting pedicels very variable, usually $\frac{1}{3}$ in. long or longer. Fruit $\frac{1}{16}$–$\frac{1}{10}$ in. long, obovoid, light-brown.

KONKAN: *Dalzell*!; streams in the Island of Salsette, *Law*! DECCAN: Igatpuri on the Thal Ghát (G. I. P. R.), *Willis*; Kasara on the Thal Ghát, *Willis*; Khandala, *Willis, Woodrow* ex *Willis*; Sákarpathár hill near Lanoli, *Woodrow* ex *Willis*; Khadshi river near Borkas, west of Poona, *Bhide* ex *Willis*; Warra Ghát between Wai and Wathár Railway-station, *Raoji*!—DISTRIB. India (W. Peninsula).

2. **GRIFFITHELLA,** Warming.

Thallus algiform, very polymorphous, $\frac{1}{25}$–$\frac{4}{5}$ in. in diam. Leaves distichous. Flowers naked, zygomorphic, emerging from an erect or ascending, tubular or funnel-shaped spathe which is irregularly ruptured at the tip. Stamens 2, monadelphous; staminodes 2. Ovary very oblique; stigmas 2, simple, subulate or more or less toothed or lobed, with small papillæ. Capsule quite smooth, nearly spherical, unequally lobed, splitting obliquely into a larger persistent and smaller deciduous lobe.—DISTRIB. India (W. Peninsula); species 1.

1. **Griffithella Hookeriana,** *Warming, Fam. Podost.* Afhandl. 6 (1901) p. 13. A minute moss-like plant 1–1½ in. high. Thallus most variable in ultimate form, sometimes cup-like or rotate, stalked, or completely attached, or creeping, ribbon-like. Leaves reaching $\frac{1}{5}$ in. long. Floral buds usually closely crowded; bracts usually 4–6, more or less cucullate. Spathe tubular or funnel-shaped, splitting into 2–many teeth at the tip. Stamens equalling or exceeding the ovary and stigmas. Stigmas subulate, cuneate, and then more or less toothed or fimbriate, the upper one then often divided into 2 to the base. Fruiting pedicels $\frac{1}{8}$–$\frac{3}{5}$ in. long. Capsules smooth, globose, variable in size. Willis, Podost. in Ann. Roy. Gard. Perad. p. 233. *Mniopsis Hookeriana*, Tul. in Ann. Sc. Nat. sér. 3, v. 11 (1849) p. 105; Wight, Icon. t. 1918, fig. 4; Dalz. & Gibs. p. 245. *Podostemon Hookerianus*, Wedd. in DC. Prodr. v. 17 (1873) p. 74; Hook. f. Fl. B. I. v. 5, p. 65; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366.—Flowers: Oct.–Dec. VERN. *Karuk-phul.*

KONKAN: *Law*!; common in running streams, flowering as soon as its head is above water, *Dalzell & Gibson*; Atgaon (Tanna districts) on the Khadshi river, *Bhide* ex *Willis*. DECCAN: Máwal (Poona districts), *Woodrow*. KANARA: Kála naddi (N. Kanara), *Talbot*, 1129!, *Ritchie*!—DISTRIB. India (W. Peninsula).

3. **HYDROBRYUM,** Endl.

Thallus closely attached to rock by hairs at all points, crustaceous or ribbon-like, exogenously lobed or branched; secondary shoots usually prostrate when floriferous, 1-flowered, with small scaly bracts. Leaves simple, subulate. Flowers zygomorphic, pedicellate or sessile, emerging from a more or less prostrate, boat-shaped spathe which splits along the upper side. Stamens 2 or 1, equalling or exceeding the ovary and stamens. Ovary subglobose, 2-celled; stigmas 2, rather large, subulate, lobed or dentate, sometimes obcuneate, entire or lacerate.

Fruit small, stalked or sessile, smooth or 8–12-ribbed. Seeds numerous. —DISTRIB. India and Ceylon; species 5.

1. **Hydrobryum lichenoides,** *Kurz, in Journ. As. Soc. Beng.* v. 42, part 2 (1873) p. 103. Thallus ribbon-like, regularly branched. Stamens 2 (rarely 1), long or short. Stigmas ovate to subulate or obcuneate, usually toothed. Fruit 8-ribbed, unequally lobed. Willis, Podost. in Ann. Roy. Gard. Peradeniya, p. 242. *Podostemon acuminatus,* Wedd. in DC. Prodr. v. 17 (1873) p. 75; Hook. f. Fl. B. I. v. 5, p. 66.

VAR. 1. *khandalensis,* Willis, Podost. in Ann. Roy. Bot. Gard. Peradeniya, v. 1 (1901–1902) p. 245. Pedicels $\frac{1}{12}$–$\frac{1}{5}$ in. long; capsules $\frac{1}{25}$–$1\frac{1}{2}$ in. long, the ribs confluent below the apex. Stamens as long as the ovary and stigmas.

DECCAN: Khandala, common, *Willis.*

VAR. 2. *bhorensis,* Willis, l. c. Pedicels $\frac{1}{5}$–$\frac{1}{3}$ in. long; capsules $\frac{1}{25}$–$\frac{1}{10}$ in. long, the ribs confluent below the apex, shallow; buds more or less erect; stamens as long as the ovary and stigmas.

DECCAN: on the Bhore Ghát near Khandala, *Willis.*

ORDER CVI. ARISTOLOCHIACEÆ.

Herbs or shrubs often climbing, usually more or less fœtid. Leaves alternate, entire or lobed; stipules 0. Flowers hermaphrodite, often large, usually lurid, terminal, axillary or lateral, solitary, racemose or cymose, bracteate or not. Perianth simple, more or less adnate below to the ovary, regular or irregular, 3-lobed or tubular; lobes valvate. Stamens 6 or more, adnate in 1 or 2 series to the top of the ovary or round the style; anthers erect with parallel cells, dehiscing dorsally. Ovary 4–6-celled; placentas parietal, free or meeting in the axis; ovules numerous, anatropous; style columnar; stigma lobed. Fruit capsular or baccate. Seeds numerous; albumen copious, fleshy; embryo minute.—DISTRIB. Genera 5; species about 200, chiefly tropical.

Shrubs; perianth campanulate, equally 3-lobed; capsule septicidally 4-valved	1. BRAGANTIA.
Perennial herbs; perianth tubular, irregular, 2-lipped; capsule septicidally 6-valved	2. ARISTOLOCHIA.

1. BRAGANTIA, Lour.

Shrubs or undershrubs. Leaves petiolate, 3–5-nerved; veins closely reticulate beneath; stipules 0. Flowers in axillary cymes, bracteate. Perianth shortly campanulate, equally 3-lobed, deciduous, valvate. Stamens 6–12 (usually 9 and connate in threes opposite the perianth-segments). Ovary inferior, 4-celled; ovules numerous, 2-seriate; style short; stigmas 3 or more, linear. Capsule elongate, 4-gonous, septicidally 4-valved, the valves separating from a placentiferous column. Seeds 3-gonous, rugose or deeply pitted, often coated with the remains of the placenta; albumen fleshy, copious; embryo minute.—DISTRIB. Species 4 or 5, Indian and Malayan.

1. **Bragantia Wallichii,** *R. Br. in Wall. Cat.* (1828) 7415. An erect slender shrub, 6–10 ft. high, the young parts finely pubescent; bark smooth, yellowish. Leaves distichous, 5–9 by 1¼–2 in., oblong-lanceolate, acutely acuminate, entire, glabrous above, stellately pubescent and paler beneath, strongly 3-nerved from the base, with reticulate venation between the nerves, base subacute; petioles ⅛ in. long, stout. Flowers in axillary irregular few-flowered cymes; bracts small, linear, acute, pubescent; pedicels rather long, densely pubescent. Perianth 3-partite; segments broadly ovate or suborbicular, ⅕ in. long, pubescent, concave. Capsules 3–4 in. long, straight, obtuse, 4-gonous. Seeds acute at both ends, 3-gonous, $\frac{1}{10}$ in. long, deeply pitted. Fl. B. I. v. 5, p. 73; Grah. Cat. p. 250; Dalz. & Gibs. p. 225; Trim. Fl. Ceyl. v. 3, p. 421; Talb. Trees, Bomb. ed. 2, p. 277; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366; Watt, Dict. Econ. Prod. v. 1, p. 519.—Flowers: Nov. VERN. *Chakráni*; *Mirsagni*.

KONKAN: S. Konkan, rare, *Nimmo & Graham, Dalzell & Gibson*; Wari jungles, *Dalzell*! KANARA: common, *Dalzell & Gibson*; Nilkund Ghát, *Woodrow*; common in the evergreen forests near the Gairsoppa Falls, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

EXCLUDED SPECIES.

BRAGANTIA DALZELLII, Hook. f. Fl. B. I. v. 5 (1886) p. 73. A fine species with leaves 12 by 3 in., torulose capsules 5–8 in. long, and 3-gonous rugose and deeply pitted seeds ½ in. long. There is 1 sheet in Herb. Kew. containing leaves and capsules but no flowers. Dalzell has given no habitat on this single specimen which is from his herbarium, so that it is impossible to say whether the plant is or is not a Bombay one. The plant has not apparently been found by any other Bombay collector. Neither Talbot nor Woodrow has seen it.

2. ARISTOLOCHIA, Linn.

Shrubs or perennial herbs, prostrate or twining. Leaves alternate, entire or lobed, often with a stipule-like leaf of an undeveloped bud in the axil. Perianth colored; tube inflated below, then contracted, hairy within; limb oblique, usually 2-lipped. Stamens 6 (rarely 5 or more than 6), adnate 1-seriately above the ovary, the filaments or connectives not distinguishable from the style; anthers adnate to the column; dehiscence extrorse. Ovary inferior, more or less perfectly 6-celled (rarely 5- or 4-celled); placentas parietal or intruded or conniving and connate in the axis; ovules many, 2-seriate; style or column short, thick, divided above into 3 or 6 (rarely more) obtuse or linear short lobes. Capsule lantern-like, septicidally 6 (rarely 5)-valved or splitting through the placentas. Seeds usually many, horizontal, often covered by the remains of the placenta; albumen fleshy; embryo minute.—DISTRIB. Species about 180, chiefly tropical.

Stems prostrate; leaves glaucous beneath; flowers solitary; bracts large, orbicular ..... 1. *A. bracteata.*
Stems twining; leaves green beneath; flowers in racemes; bracts small, ovate or oblong.
  Leaves reaching 4 in. long, rounded, cuneate or subcordate at base; petioles ⅛–⅓ in. long; racemes few-flowered ..... 2. *A. indica.*
  Leaves reaching 8 in. long, deeply cordate at base; petioles 1–2 in. long, twining; racemes many-flowered ..... 3. *A. Tagala.*

1. **Aristolochia bracteata,** *Retz. Obs. Bot.* fasc. 5 (1789) p. 29. A slender perennial; stems 12–18 in. long, weak, prostrate, branched, striate, glabrous. Leaves 1½–3 in. long and as broad as long, reniform or broadly ovate, usually obtuse, cordate at base with a wide shallow sinus, glaucous beneath, finely reticulately veined, glabrous; petioles ½–1¼ in. long. Flowers solitary; pedicels with a large sessile orbicular or subreniform bract at the base. Perianth 1–1¾ in. long, base subglobose, tube cylindric with a trumpet-shaped mouth, lip linear, dark-purple, with revolute margins, finely reticulately veined, as long as the tube. Capsules ½–¾ in. long, oblong-ellipsoid, 12-ribbed, glabrous. Seeds ¼ in. long, deltoid with a slightly cordate base. Fl. B. I. v. 5, p. 75; Grah. Cat. p. 178; Dalz. & Gibs. p. 224; Trim. Fl. Ceyl. v. 3, p. 422; Talb. Trees, Bomb. ed. 2, p. 278; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366; Prain, Beng. Pl. p. 890; Watt, Dict. Econ. Prod. v. 1, p. 314.—Flowers: Aug.–Nov. VERN. *Kidámár*; *Gandháti.*

Abundant in the black soil of the Deccan and Gujarat, *Dalzell & Gibson.* KONKAN: *Law!* DECCAN: *Graham*; East Deccan, *Woodrow!* S. M. COUNTRY: Badami, *Cooke!* SIND: Hala range, *Vicary!*; Jemadar ka Landa near Karachi, *Stocks!*—DISTRIB. India (Bengal, W. Peninsula); Ceylon, Arabia, Tropical Africa.

Every part of the plant is nauseously bitter. It is much used by Hindu physicians on account of its purgative and anthelmintic properties and the juice of the plant is squeezed into wounds to kill worms. Hence its native name *Kidámár.* See Watt, Dict. Econ. Prod. l. c.

2. **Aristolochia indica,** *Linn. Sp. Pl.* (1753) p. 960. Shrubby, twining; stems long, slender, woody at the base, grooved, glabrous. Leaves variable; in the broad form 4–5 by 3 in.; in the narrow form 1½–4 by ½–1 in., from linear-oblong to obovate-oblong or subpanduriform, usually obtusely acuminate, glabrous, entire with somewhat undulate margins, base cuneate, rounded, subtruncate or subcordate. Flowers in few-flowered axillary racemes; bracts small, ovate, acuminate, opposite the pedicels; pedicels long, thickened above. Perianth greenish-white, reaching 1¾ in. long, with globose inflated base, then bent at a right angle and suddenly narrowed into a cylindric tube with oblique trumpet-shaped mouth gradually passing into a long narrow, linear-oblong, obtuse brownish lip. Anthers 6. Style 6-lobed. Capsules 1½–2 in. long, oblong or globose-oblong, opening from below upwards, 6-valved, the pedicels splitting into 6 filaments. Seeds deltoid-ovate, acute, flat, winged. Fl. B. I. v. 5, p. 75; Grah. Cat. p. 178; Dalz. & Gibs. p. 224; Trim. Fl. Ceyl. v. 3, p. 423; Talb. Trees, Bomb. ed. 2, p. 277; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366; Prain, Beng. Pl. p. 890; Watt, Dict. Econ. Prod. v. 1, p. 315.—Flowers: Nov. VERN. *Sapsund*; *Sampsun.*

KONKAN: Cross Island (Bombay Harbour), *Graham.* S. M. COUNTRY: *Belgaum, Ritchie,* 1077!; Badami, *Cooke!*—DISTRIB. India (Bengal, Nipal, W. Peninsula); Ceylon.

3. **Aristolochia Tagala,** *Cham. in Linnæa,* v. 7 (1832) p. 207. An extensively climbing shrub; stems grooved, stout, glabrous. Leaves 4–8½ in. long, the upper leaves 2–3 in., the lower 3–5 in. broad, ovate or ovate-oblong (the upper often subsagittately lanceolate), acute or acuminate, base cordate usually with a deep and narrow sinus, glabrous,

reticulately veined; petioles twining, 1–2 in. long. Flowers numerous, in lax puberulous racemes, most of the flowers abortive, usually only 1 fertile; bracts small. Perianth 2–2½ in. long, base globose, greenish-yellow; tube curved, mouth oblique; lip linear, straight, obtuse, villous, as long as the tube. Capsules 1–1½ in. long, globose-pyriform or oblong-ellipsoid, transversely rugulose, glabrous, the pedicels usually splitting into 6 filaments in fruit. Seeds ¼–⅜ in. long and as broad as long, broadly ovate-deltoid with a deep membranous wing, flattened, usually tuberculate on one face. Prain, Beng. Pl. p. 890. *Aristolochia Roxburghiana*, Klotzsch, in Monatsb. Berl. Akad. (1859) p. 696; Hook. f. Fl. B. I. v. 5, p. 75; Talb. Trees, Bomb. ed. 2, p. 277. *A. acuminata*, Roxb. Fl. Ind. v. 3 (1832) p. 489 (*not* of Lam.); Wight, Icon. t. 771; Grah. Cat. p. 178; Dalz. & Gibs. p. 224.

Rare. *Dalzell* without locality in Herb. Kew.! KONKAN: S. Konkan, *Nimmo* ex *Graham*; banks of Chapora River at Maniri in the Wari Country, *Dalzell & Gibson*. DECCAN: Párghát leading to Mahableshwar, *Dalzell & Gibson*.—DISTRIB. (India, Bengal, Assam, Silhet, Birma, W. Peninsula); Ceylon, Java, Borneo.

Several species are grown as ornamental plants in gardens, of which the most common are the following:—

Aristolochia brasiliensis, Mart. & Zucc. Nov. Gen. & Sp. v. 1 (1824) p. 77. A native of Brazil with curious flowers, the upper lip of which with its inflated tube resembles the head and beak of a bird. *A. ornithocephala*, Hook. Bot. Mag. t. 4120; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366 & Gard. in Ind. ed. 5, p. 432.—VERN. *Popat-vel*.

Aristolochia fimbriata, Cham. in Linnæa, v. 7 (1832) p. 210, t. 6. A very pretty plant from Buenos Ayres, bearing in June solitary axillary greenish-white flowers of curious form, the tube being much swollen, the expanded part on the inside dark-brown netted with bright yellow and surrounded by black-tipped yellow hairs pointing inwards in bud. The flowers measure 2 in. in length by 1 in. in width at the broadest part. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366 & Gard. in Ind. ed. 5, p. 432. A.

Aristolochia elegans, Masters, in Gard. Chron. v. 24 (1885) p. 301. A small free-flowering species, a native of Brazil, with ovate cordate leaves. The flowers have a slightly dilated tube which is suddenly bent upwards, the upper part dilated into a cordate cup-shaped limb of a rich purple color ornamented with creamy-white markings and having a golden-yellow eye surrounded by rich velvety purple. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366 & Gard. in Ind. ed. 5, p. 431.

ORDER CVII. PIPERACEÆ.

Herbs or shrubs often with swollen nodes, usually aromatic. Leaves alternate, opposite or whorled, often gland-dotted; stipules 0 or 2, connate, or adnate to the petiole. Flowers minute, hermaphrodite or unisexual, in axillary or terminal catkin-like spikes subtended by a peltate bract. Perianth 0. Stamens 2–6 (rarely 7–8), hypogynous;

anthers often jointed on the filaments, the cells sometimes confluent; dehiscence longitudinal. Ovary of 3–4 carpels with many ovules; less commonly ovary 1-celled with 1 ovule; ovules orthotropous; stigmas distinct on the free carpels or ovary-lobes or terminal on the undivided ovary, occasionally solitary, sessile, terminal, simple or penicillate. Fruit small, indehiscent in the 1-celled species or of cocci or follicles in the many-carpelled species. Seeds globose, ovoid or oblong; testa thin; albumen copious, floury; embryo enclosed in an amniotic cavity at the end of the albumen remote from the hilum; cotyledons minute or obsolete; radicle superior.—DISTRIB. Genera 8; species enumerated exceeding 1000, chiefly tropical American.

Anther-cells distinct; fruit tolerably large; stigmas 3–5, confluent. 1. PIPER.
Anther-cells confluent; fruit minute; stigmas usually penicillate... 2. PEPEROMIA.

1. **PIPER,** Linn.

Shrubs (rarely herbs), erect or scandent, often glandular and aromatic; branches with swollen nodes. Leaves entire, often unequal-sided; stipules various. Flowers dicœcious (very rarely hermaphrodite), minute, spicate, each in the axil of a bract with or without 2 lateral bracteoles; bracts peltate or cupular and adnate to the rhachis, sometimes decurrent, with or without raised margins; bracteoles when present forming low ridges on each side of the flower or connate in a semilunar form. Perianth 0. Stamens 2–4 (rarely more); filaments short; anthers 2-celled, the cells distinct. Ovary 1-celled; ovule solitary, erect; style short, conic, beaked or 0; stigmas 2–5. Fruit a small ovoid or globose 1-seeded berry. Seeds usually globose; testa thin; albumen floury within, with hardened periphery.—DISTRIB. Tropical and subtropical; species perhaps 300.

Shrubby, climbing; flowers in simple spikes, usually dicœcious.
  Glabrous shrubs.
    Leaves usually acute at the base; fruit yellow ..... 1. *P. trichostachyon.*
    Leaves usually rounded at the base; fruit red ..... 2. *P. nigrum.*
  Grey-hirsute; leaves subcordate at base..... 3. *P. Hookeri.*
Herbaceous, erect; flowers in subumbellate spikes, hermaphrodite ..... 4. *P. subpeltatum.*

1. **Piper trichostachyon,** *Cass. DC. in DC. Prodr.* v. 16, part 1 (1869) p. 242. A stout woody climber. Leaves 3–5¼ by 1–2 in., elliptic-lanceolate, acutely acuminate, dark green and shining above, paler beneath, glabrous, the margins slightly revolute, base usually acute, nearly equal-sided, 3-nerved, with 2 subopposite nerves a little higher up; petioles ¼–⅝ in. long, glabrous. Flowers in lax more or less interrupted pubescent spikes 3–4 in. long; bracts of male flowers waxy-white, globose, sessile, furnished within with long hairs between which the stamens appear like 2 eyes. Fruit globose, ⅓ in. in diam., yellow. Fl. B. I. v. 5, p. 80; Talb. Trees, Bomb. ed. 2, p. 278; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366. *Muldera trichostachya,* Miq. in Hook. Lond. Journ. Bot. v. 5 (1846) p. 556; *Wight, Icon. t.* 1944.

Stocks without locality in Herb. Kew.! KONKAN: *Law!*; Matheran, *Cooke!* DECCAN: Khandala, *Dalzell !, Woodrow.* KANARA: evergreen forests, *Talbot.*—Flowers: Oct.–Apr.—DISTRIB. India (W. Peninsula).

2. **Piper nigrum,** *Linn. Sp. Pl.* (1753) p. 28. A stout glabrous climber; stems terete, sparingly rooting, much thickened at the nodes.

Leaves coriaceous, 4–7 by 2–5 in., broadly ovate, acuminate, glabrous, 5–9-nerved, the supra-basal nerves usually alternate, base usually rounded, more or less oblique; petioles ½–1 in. long. Flowers in slightly interrupted glabrous spikes of variable length (2–6 in.), diœcious or sometimes polygamous; bracts of the female spikes more or less adnate to the rhachis, forming a short hemispheric cup beneath the ovary; bracteoles forming a semilunar ridge above the ovary. Stamens 2. Stigmas 2–4. Fruit globose, ¼ in. in diam. or less, at first yellow, afterwards becoming red when fully ripe. Fl. B. I. v. 5, p. 90; Grah. Cat. p. 198; Dalz. & Gibs. Suppl. p. 84; Trim. Fl. Ceyl. v. 3, p. 427; Talb. Trees, Bomb. ed. 2, p. 279; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366 & Gard. in Ind. ed. 5, p 448; Prain, Beng. Pl. p. 893; Watt, Dict. Econ. Prod. v. 6, part 1, p. 260. *Piper trioicum*, Roxb. Fl. Ind. v. 1, p. 151; Wight, Icon. t. 1935; Grah. Cat. p. 199.—Flowers: Nov.–Jan. VERN. *Kála-miri*; *Mirvel*.

Doubtfully indigenous, but found abundantly in some of the N. Kánara forests probably as an escape. It is cultivated in the Konkan and Kanara, and the fruit furnishes the *black* and, when divested of its skin, the *white pepper* of commerce. See Watt, Dict. Econ. Prod. l. c.—DISTRIB. Cultivated in India, Ceylon, and the tropics generally.

3. **Piper Hookeri,** *Miq. in Hook. Lond. Journ. Bot.* v. 4 (1845) p. 437. A climbing shrub; branches stout, subterete; branchlets hairy. Leaves equal-sided, 2–4 by 1½–2 in., brown when dry, ovate or oblong-lanceolate, obtusely acuminate, thinly coriaceous, glabrous above, hairy beneath, 5–7-nerved from a subcordate equal or less commonly oblique base, or with 2 of the nerves slightly supra-basal and opposite; petioles ¼–¾ in. long, hairy or tomentose. Flowers in slender spikes, the male spikes 3–6 in. long; bracts of male flowers orbicular, sometimes adnate below and shortly decurrent. Stamens 2. Stigmas 3–4, grey-tomentose, reflexed. Fruit globose. Fl. B. I. v. 5, p. 88; Dalz. & Gibs. p. 315 (by error 115); Talb. Trees, Bomb. ed. 2, p. 278; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366.—Flowers: Apr.–Sept.

KONKAN: Matheran, *Cooke*! DECCAN: Mahableshwar, *Cooke*!, *Dalzell & Gibson*, *Law*!; on the Ghâts from Bombay southwards to Kanara, *Talbot*.—DISTRIB. India (W. Peninsula).

4. **Piper subpeltatum,** *Willd. Sp. Pl.* v. 1 (1797) p. 166. A large perennial erect herb 3–5 ft. high; stem thick, jointed, warted, but glabrous, branched. Leaves very large, 8–12 in. in diam., orbicular, shortly acuminate, entire or nearly so, glabrous except on the nerves beneath, closely gland-dotted, base deeply cordate with a narrow sinus, palmately nerved; petioles 4–8 in. long, striate, amplexicaul at the base. Flowers hermaphrodite, minute, very numerous and closely packed; spikes subumbellate, 3–7 together, 3–5 in. long, very shortly pedicellate; bracts small, stalked, succulent, with a thickened triangular glabrous tip. Stamens 2. Stigmas 3. Fruit minute, trigonous, obovoid, truncate, brown. Fl. B. I. v. 5, p. 95; Trim. Fl. Ceyl. v. 3, p. 429; Talb. Trees, Bomb. ed. 2, p. 279. *Pothomorphe subpeltata*, Miq. Syst. Pip. p. 213; Wight, Icon. t. 1925.—Flowers: Oct.–Jan.

Rare. KANARA: in open situations in some evergreen forests of N. Kanara, *Talbot*. —DISTRIB. India (W. Peninsula); Ceylon, Penang, Malay Islands, Tropical Africa, Madagascar.

Piper Betle, Linn. Sp. Pl. (1753) p. 28. A perennial dicœcious climber probably a native of Java, widely cultivated for its leaf throughout the Presidency, supplying the well-known *Pán* or *betel-leaf* which is chewed almost universally by the natives. The plants (*vines*) are supported in the betle-gardens on quick-growing trees or shrubs, such as Erythrina indica (*Pángara*) and Sesbania ægyptiaca (*Shewri*). A very full description of the mode of cultivation &c. will be found in Watt's Dict. Econ. Prod. v. 6, part 1, pp. 247–256. Fl. B. I. v. 5, p. 85; Grah. Cat. p. 198; Dalz. & Gibs. Suppl. p. 84; Trim. Fl. Ceyl. v. 3, p. 425; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366 & Gard. in Ind. ed. 5, p. 445; Talb. Trees, Bomb. ed. 2, p. 279; Prain, Beng. Pl. p. 892; Watt, Dict. Econ. Prod. v. 6, part 1, p. 247. *Chavica Betle*, Miq. Syst. Pip. p. 28; Wight, Icon. t. 1926.—VERN. *Nágvel.*

Piper longum, Linn. Sp. Pl. (1753) p. 29. *The Long Pepper*, a native of the hotter parts of India but not indigenous in the Bombay Presidency, though occasionally cultivated. Stems prostrate or ascending (not climbing). Leaves cordate, glabrous, the lower with long petioles, the upper sessile and stem-clasping. Fruit small, about $\frac{1}{10}$ in. in diam., blackish-green, sunk in the fleshy spike which is about 1 in. long. Fl. B. I. v. 5, p. 83; Grah. Cat. p. 199; Dalz. & Gibs. Suppl. p. 84; Trim. Fl. Ceyl. v. 3, p. 424; Talb. Trees, Bomb. ed. 2, p. 279; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366; Prain, Beng. Pl. p. 892; Watt, Dict. Econ. Prod. v. 6, part 1, p. 258.—Flowers: Oct.–Nov. VERN. *Pipli.*

The dried unripe fruit and the root are much employed in native medicine and no doubt possess valuable medicinal properties. See Watt, Dict. Econ. Prod. l. c.

2. **PEPEROMIA,** Ruiz & Pav.

Annual or perennial usually succulent herbs. Leaves opposite or whorled (less commonly alternate), entire, pellucido-punctate; stipules 0. Flowers minute, hermaphrodite, sessile or sunk in the rhachis, often whorled, erect, in terminal or leaf-opposed (rarely axillary), solitary or fascicled spikes; bracts sessile, sometimes peltately attached. Perianth 0. Stamens 2; filaments very short; anther-cells confluent. Ovary 1-celled, obtuse, acute or beaked; ovule solitary, erect; stigma lateral or terminal, usually penicillate. Fruit a minute indehiscent almost dry berry or nutlet; pericarp thin. Seed minute; testa membranous; albumen floury.—DISTRIB. Species about 400, chiefly tropical and American.

1. **Peperomia Wightiana,** *Miq. in Hook. Lond. Journ. Bot.* v. 5 (1846) p. 548. A small succulent herb 3–8 in. high; stems procumbent or ascending, rooting, slender, glabrous or nearly so. Leaves subfleshy, ½–1¼ by ⅜–1 in., alternate or opposite, the upper sometimes ternately whorled, elliptic or obovate, sometimes suborbicular, obtuse, gland-dotted, the margins more or less ciliolate near the tip, base acute or rounded; nerves 3 from the base, somewhat obscure; petioles ¼–½ in. long, slender. Flowers laxly arranged in slender pedunculate erect spikes 1–¾ in. long, much exceeding the leaves; spikes 1–3 together, usually terminal. Fruit minute, globose, slightly rough. Fl. B. I. v. 5, p. 98; Trim. Fl. Ceyl. v. 3, p. 431; Woodr. in Journ. Bomb. Nat.

v. 12 (1899) p. 366. *Peperomia portulacoides*, Dalz. & Gibs. Bo. Fl. p. 225 (*not* of Miq.); Woodr. in Journ. Bomb. Nat. l. c.—Flowers: July–Oct.

Stocks without locality in Herb. Kew.! KONKAN: on trees, *Dalzell*! DECCAN: Koina Valley below Mahableshwar, *Cooke*! KANARA: *Law*!—DISTRIB. India (W. Peninsula); Ceylon.

Peperomia pellucida, H. B. & K. Nov. Gen. & Sp. v. 1 (1815) p. 64. A succulent slender much-branched annual herb with weak procumbent glabrous stems 8–20 in. long, broadly ovate acute cordate thinly membranous 5–7-nerved opposite leaves, and very slender terminal and leaf-opposed spikes, a native of S. America, now quite naturalized in the Island of Bombay, where it is abundant, especially near Sewri.

The plant has also been naturalized in Calcutta and elsewhere in India. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 366; Prain, Beng. Pl. p. 894.

ORDER CVIII. MYRISTICACEÆ.

Evergreen trees often stellately tomentose. Leaves alternate, entire, often pellucido-punctate; stipules 0. Flowers small, dicœcious, regular, fasciculate, umbellate or paniculate; bracteoles persistent or caducous. Perianth simple, inferior, coriaceous, deciduous; lobes usually 3, sometimes 2 or 4, connate below, valvate in bud. MALE FLOWERS: Stamens monadelphous, 3–18 (less often 30–45); anthers usually sessile, ovate or linear, 2-celled, adnate dorsally to a central vertical cylindric or angled sessile or stalked column, free from each other or connate, less often attached by their bases, without or with short filaments, to the edge of a peltate stipitate disk; dehiscence always extrorse; rudimentary pistil 0. FEMALE FLOWERS: Staminodes 0 or very rare. Ovary free, sessile at the base of the perianth, 1-celled; ovule solitary, basal, erect, anatropous; stigma usually sessile (rarely with a short style), capitate, discoid or lobed. Fruit more or less fleshy or thickly coriaceous, often splitting into 2 (rarely 4) valves. Seed erect, enclosed in a fleshy or membranous entire lobed or laciniate, usually highly colored, often aromatic aril; testa usually thick; albumen copious, hard, ruminate; embryo small, basal; cotyledons divaricate, flat or crumpled; radicle short, inferior.—DISTRIB. Tropical East Asia, Malaya, America, Africa, Australia; genus 1; species about 80.

1. MYRISTICA, Linn.

Character of the Order.

Male flowers in cymes or umbels; perianth 3-toothed with a bracteole at the base; staminal-column elongate; anthers connate to the column and to each other; aril laciniate.

- Male flowers in lax branched cymes at least twice as long as the petioles; fruit elongate-oblong, 2–2½ by 1–1½ in.... 1. *M. malabarica.*
- Male flowers in condensed many-flowered umbels or cymes, shorter or scarcely longer than the petioles; fruit subglobular or ovoid.
  - Leaves 6–10 in. long; fruit subglobular, 2½ in. in diam. 2. *M. Beddomei.*
  - Leaves 12–24 in. long; fruit ovoid, 3–4 in. long ..... 3. *M. magnifica.*

Male flowers in very shortly pedunculate axillary 3–6-flowered umbels; perianth deeply cleft; pedicels with a bracteole about the middle; staminal column peltate, subconcave; anthers attached by short filaments to its edge, radiating from the edge of the flattened column and dehiscing downwards; aril entire; fruit shortly pointed, 1–1½ in. long ..... 4. *M. attenuata.*

. 1. **Myristica malabarica,** *Lamk. in Mém. Acad. Sc. Par.* (1788) p. 162. A moderate-sized tree, all parts but the inflorescence glabrous; bark smooth with small lenticular spots, the inner bark with much red juice (*Talbot*); young branches very thin, pale. Leaves thinly coriaceous, 4–6 by 1¼–2¼ in., oblong or elliptic-lanceolate, subacute, shining above, dull beneath, base acute; main nerves 8–14 pairs, slender, not very prominent; petioles ⅜–½ in. long. MALE FLOWERS in slender open 2-3-chotomous axillary or lateral subumbellate cymes 1–2 in. long; buds ⅕ in. long, ovoid-globose; peduncles long, slender; pedicels ¼–½ in. long, slender, puberulous; bracteole small, suborbicular, closely appressed to the base of the flower at one side. Perianth minutely scurfy-puberulous outside, glabrous inside; teeth short, triangular. Staminal-column stalked, apiculate; stalk about ¼ the height of the column, tomentose; anthers 10–14, linear. FEMALE FLOWERS more globose and larger than the males, in few-flowered axillary umbels scarcely longer than the petioles. Perianth-teeth ovate. Bracteole forming a narrow imperfect cup round the base of the perianth. Ovary sessile, ovoid-globose, pointed, densely rufous-tomentose; stigma large, sessile, 2-lobed. Fruit elongate, oblong, pointed, densely rufous-tomentose, 2–2½ by 1–1¼ in. Seed oblong, obtuse, slightly flattened on one side; testa shining; aril yellow, irregularly lobed and laciniate, extending to the apex of the seed. Fl. B. I. v. 5, p. 103; Dalz. & Gibs. p. 4; Bedd. Flor. Sylvat. t. 269; King, in Ann. Roy. Bot. Gard. Calc. v. 3, part 3, p. 288, t. 109; Talb. Trees, Bomb. ed. 2, p. 280; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367; Watt, Dict. Econ. Prod. v. 5, p. 314. *Myristica tomentosa,* Grah. Cat. p. 175 (*not* of Hook. f. & Thoms.).—Flowers: Nov.–Mar. VERN. *Rán-jáyphal*; *Káyphal.*

KONKAN: evergreen forests of the Konkan Ghâts, *Talbot*; Malwán, *Gibson*! KANARA: common in the forests of the Kumpta táluka, *Talbot*; Chandavar (N. Kanara), *Woodrow*!—DISTRIB. India (W. Peninsula in wet forests at the base of hills).

Both the yellowish Mace and the Nutmegs are exported from N. Kanara to Bombay, and the former is said to be exported thence to the Continent (chiefly to Germany) as an adulterant for true Mace. See Watt, Dict. Econ. Prod. l. c.

2. **Myristica Beddomei,** *King, in Ann. Roy. Bot. Gard. Cal.* v. 3, part 3 (1891) p. 291, t. 118. A tall evergreen tree, glabrous except the underside of the leaves and the inflorescence; bark smooth. Leaves coriaceous, 6–10 by 2½–3½ in., oblong or elliptic-lanceolate, acute, shining above, dull and glaucous beneath, base rounded or suddenly cuneate; main nerves 13–17 pairs; petioles ⅝–1¼ in. long. MALE FLOWERS in pedunculate woody 8–20-flowered axillary cymes; peduncles short, stout; bracteole suborbicular, tomentose, oblique, embracing a large part of the perianth on one side; pedicels $\frac{1}{10}$ in. long or 0. Perianth ⅕ in. long, ovoid, rufous-pubescent outside, glabrous inside; teeth 3, broadly triangular, about $\frac{1}{16}$ in. long. Staminal-column shorter than the perianth, cylindric, bluntly apiculate, stalked; anthers 9 or 10,

linear. FEMALE FLOWERS sessile, in axillary few-flowered cymes. Perianth globular-urceolate, expanded below the 3 spreading ovate teeth, pubescent outside. Ovary sessile, globose, narrowed to the apex, appressedly pubescent; stigma sessile, large, slightly oblique, subglobose. Fruit 2¼ in. in diam., solitary or in pairs, subglobose, apiculate, grooved on one side along the suture; pericarp minutely rufous-pubescent, thick, succulent; pedicels ¼ in. long, very stout. Seed globose, smooth; aril red, fleshy, extending to the apex. *Myristica laurifolia*, Bedd. Flor. Sylvat. t. 267; Hook. f. Fl. B. I. v. 5, p. 103; Talb. Trees, Bomb. ed. 2, p. 280; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367, all in part (*not* of Hook. f. & Thoms.).—Flowers: Dec.–Feb. VERN. *Jáyphal*; *Jajikai*.

KONKAN: Ghâts, *Talbot*. KANARA: common in the evergreen forests of the Southern Ghâts of N. Kanara, *Talbot*; Chandavar (N. Kanara), *Woodrow*!; Katgal (Karwar districts), *Kanitkar*!—DISTRIB. India (W. Peninsula), apparently endemic.

I have followed Sir George King (*l. c.*) in separating this from *M. laurifolia*, Hook. f. & Thoms., which name is restricted to the Ceylon plant.

3. **Myristica magnifica,** *Bedd. Flor. Sylvat.* (1872) t. 263. A tree 90–100 ft. high; bark smooth; trunk when young furnished with large aërial roots, which start from the trunk 10 or 20 ft. from the ground and are about ½ in. thick at the ends, afterwards developing into buttresses. Leaves coriaceous, 12–24 by 3½–8 in., elliptic-lanceolate, acute or acuminate, glabrous and shining above, silvery beneath, base rounded; main nerves 20–26 pairs, prominent on the lower side, impressed above, curving upwards and looping within the margin; petioles 1 in. long, stout, channelled. MALE FLOWERS in dense 8–15-flowered clusters from very short woody axillary tubercles; buds ovoid, their bases on one side embraced by a semiorbicular sericeous bracteole; pedicels $\frac{1}{10}$ in. long or 0. Perianth ⅕ in. long, ovoid-globose, silky-tomentose outside, glabrous inside; teeth 3 or 4, sharp. Staminal-column much shorter than the perianth, with a short hairy stalk, ovoid-cylindric, bluntly apiculate; anthers about 15, narrow, slightly unequal in length. FEMALE FLOWERS unknown. Fruit 3–4 by 2 in., solitary or in pairs, axillary, pedicellate, rufous-puberulous, ovoid; pedicels very stout, ½–⅝ in. long; pericarp thick, fleshy. Seed 2 by 1 in., subcylindric or ellipsoid, striate; aril narrowly laciniate from near the base, its segments much conduplicate at the apex. Fl. B. I. v. 5, p. 104; King, in Ann. Roy. Bot. Gard. Calc. v. 3, part 3 (1891) p. 291, t. 119; Talb. Trees, Bomb. ed. 2, p. 280.

Rare. KANARA: near Malamâni on the Gairsoppa Ghât in evergreen forests, *Talbot*.—DISTRIB. India (W. Peninsula).

4. **Myristica attenuata,** *Wall. Cat.* (1828) 6791. A tall evergreen tree; youngest branches and inflorescence covered with golden or tawny furfuraceous deciduous tomentum, ultimately glabrous and striate, slender; bark scaly, coming off in patches exposing a brown surface beneath, the inner bark with much red juice. Leaves thinly coriaceous, 5–9 by 1¾–2⅞ in., elliptic-oblong or elliptic-lanceolate, acute or acuminate, glabrous and shining above, pale and glaucous beneath, base rounded or shortly cuneate; main nerves 12–20 pairs, prominent beneath; petioles ⅜–½ in. long. MALE FLOWERS obovate-globose, ⅓ in. in diam., in 3–6-flowered shortly pedunculate axillary umbels; pedicels

$\frac{1}{4}$–$\frac{3}{8}$ in. long with a bracteole above the middle. Perianth deeply divided; segments 3, fleshy, concave, densely rufous-woolly outside, glabrous inside. Staminal-disk stalked, subconcave, glabrous; anthers about 13, ovate, dehiscing downwards; filaments short. FEMALE FLOWERS in umbels like the males but fewer-flowered, subsessile or sessile. Perianth cylindric or narrowly ovoid, slightly gibbous at the base, 3-toothed; otherwise as in the male. Ovary sessile, ovoid, densely tomentose; style short, fleshy, glabrous, expanding above into a 2-lobed fleshy stigma, the lobes somewhat corrugated externally. Fruit 1–1½ in. long, ellipsoid or subovoid, abruptly and shortly pointed, densely clothed with rusty furfuraceous tomentum, but ultimately subglabrous. Seed narrowly ovoid; aril thin, uniform, completely covering the seed. Fl. B. I. v. 5, p. 110; Dalz. & Gibs. p. 4; Bedd. For. Man. in Flor. Sylvat. p. clxxvi; King, in Ann. Roy. Bot. Gard. Calc. v. 3, part 3 (1891) p. 316, t. 152; Talb. Trees, Bomb. ed. 2, p. 281; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367. *Myristica corticosa*, Bedd. Flor. Sylvat. t. 271 (*not* of Lour. nor of Hook. & Thoms.). *M. amygdalina*, Grah. Cat. p. 175 (*not* of Wall.).—Flowers: Oct.–Feb. VERN. *Rukt-mara.*

KONKAN: *Law*!; Ghâts, *Dalzell*!; evergreen forests, *Talbot*; Wari jungles, *Dalzell*! DECCAN: deep ravines at Khandala, *Graham.* KANARA: evergreen forests, common, *Talbot*; Divimana Ghât (N. Kanara), *Woodrow*!—DISTRIB. India (W. Peninsula), apparently endemic.

ORDER CIX. LAURACEÆ.

Erect aromatic trees or shrubs usually evergreen [very rarely (*Cassytha*) leafless parasitic climbers]. Leaves alternate (rarely opposite or deciduous), gland-dotted; stipules 0. Flowers regular, small, hermaphrodite (rarely 1-sexual), in axillary cymes, clusters, racemes or panicles; bracts deciduous, often involucrate, sometimes 0. Perianth usually inferior; tube short, sometimes enlarging in fruit; lobes of limb usually 6 (rarely 4), 2-seriate, the lobes of each series imbricate (rarely subvalvate), all similar, small, herbaceous or petaloid and equal; or the outer rarely smaller very rarely longer than the inner, occasionally one or more lobes abortive or one or more additional lobes present. Stamens usually a multiple of the perianth-lobes in 2–4 series on the tube; filaments flattened, the inner or some or all the filaments often 2-glandular at the base; anthers erect, 2- or 4-celled, the cells dehiscing by upcurved at length deciduous valvular lids. Ovary sessile at the base of the perianth-tube, 1-celled; ovule solitary, anatropous, pendulous from the apex of the cell. Fruit a dry or fleshy berry, naked or rarely enclosed in or adnate to the perianth-tube; the stalk often thickened. Seed pendulous; testa membranous; albumen 0; cotyledons plano-convex, fleshy; radicle minute, superior.—DISTRIB. Genera 34; species 800–900, chiefly in the warmer regions of America, Asia, Australia, and the Pacific Islands.

Trees or shrubs.
- Anther-cells of third row (if present) extrorse; flowers hermaphrodite (rarely polygamous).
  - Anthers 2-celled.
    - Perianth-tube persistent, enclosing the fruit ... 1. CRYPTOCARYA.
    - Perianth quite deciduous ... 2. BEILSCHMIEDIA.

Anthers 4-celled.
Perianth in fruit with persistent tube and usually deciduous segments ..... 3. CINNAMOMUM.
Perianth in fruit with persistent reflexed segments ..... 4. MACHILUS.
Perianth wholly deciduous ..... 5. ALSEODAPHNE.
Anther-cells of all rows introrse, 4-celled; flowers dicecious.
Flowers clustered in densely imbricating (not whorled) bracts ..... 6. ACTINODAPHNE.
Flowers umbellate, the heads supported by 4-6 whorled bracts ..... 7. LITSEA.
Parasitic leafless twining herbs ..... 8. CASSYTHA.

1. CRYPTOCARYA, R. Br.

Evergreen trees or shrubs. Leaves usually alternate, 3-nerved from the base or penninerved. Flowers small, hermaphrodite, in axillary and subterminal panicles. Perianth-tube turbinate or ovoid, ultimately narrowed at the top; lobes of limb 6, subequal. Stamens 9 perfect, those of the 2 outer series with eglandular filaments and introrse 2-celled anthers, those of the third series with 2-glandular filaments and extrorse 2-celled anthers, those of the fourth series replaced by stipitate staminodes. Ovary sessile at the base of the perianth, enclosed in the tube; style shortly exserted; stigma obtuse or discoid. Fruit wholly enclosed in the perianth-tube and sometimes adnate to it; tube accrescent, hardened or somewhat fleshy, smooth or ribbed, the mouth occluded; limb deciduous or more or less persistent; pericarp membranous or hard. Seed with a membranous testa often scarcely separable from the pericarp.—DISTRIB. Species 40, tropical and subtropical.

1. **Cryptocarya Wightiana**, *Thw. Enum.* (1861) p. 254. A large tree; young parts rusty-pubescent; bark thin, with large corky lenticels. Leaves coriaceous, 4–10 by 1¾–4 in., elliptic-oblong, shortly acuminate, glabrous above, whitish beneath, base subacute or rounded; main nerves 7–10 pairs, prominent and more or less pubescent beneath, arcuate, with reticulate venation between; petioles ½–¾ in. long. Flowers yellowish, numerous, in spreading axillary pubescent panicles usually shorter than the leaves; pedicels short. Perianth of male flowers ⅛ in. long, pubescent outside, divided about ½-way down; segments oblong, obtuse. Fruit ½ in. in diam. or ½ by ⅜ in., subglobose or oblong-ellipsoid, glabrous, purple-black.

The fruit of the specimens from Matheran is oblong-ellipsoid, that of specimens from Travancore and Ceylon seems to be more globose. Fl. B. I. v. 5, p. 120; Bedd. Flor. Sylvat. t. 299; Trim. Fl. Ceyl. v. 3, p. 439; Talb. Trees, Bomb. ed. 2, p. 282; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367; Watt, Dict. Econ. Prod. v. 2, p. 624. *Cryptocarya floribunda*, Wight, Icon. t. 1829 (*not* of Nees); Dalz. & Gibs. p. 222.—Flowers: Dec.–Apr. VERN. *Gulmur.*

KONKAN: Matheran, *Cooke!*, *Woodrow*, *H. M. Birdwood.* KANARA: *Stocks!*; Yellapur Ghâts, *Talbot*, 2879!; Nilkund Ghât, *Talbot*, 2872!—DISTRIB. India (W. Peninsula); Ceylon.

EXCLUDED SPECIES.

CRYPTOCARYA STOCKSII, Meissn. in DC. Prodr v. 15, part 1, p. 71. A large tree; branches and panicles rusty-tomentose. Leaves 2½–4 in. long, rigidly coriaceous, oblong, obtuse or rounded at the tip, glabrous above, glaucous beneath; nerves 6-7 pairs, stout, pubescent or glabrous. Panicles shorter than the leaves, dense-flowered. Fruit ovoid, ⅓ in. long.

There is one sheet from Dalzell's and one from Stocks's Herbarium in Herb. Kew. Neither of these has reliable localities assigned to the plant. Talbot says (Trees, Bomb. ed. 2, p. 282) that he has not seen the tree in any of the N. Kanara forests. The specimens in Herb. Kew. may be from S. Kanara and therefore outside the Bombay area. Woodrow does not include it in his list.

2. **BEILSCHMIEDIA,** Nees.

Evergreen trees or shrubs. Leaves alternate or opposite. Flowers small, hermaphrodite, fasciculate or paniculate. Perianth-tube short; lobes of limb subequal. Stamens 9 perfect, those of the 2 outer series with eglandular filaments and introrse 2-celled anthers; those of the third series with 2-glandular filaments and extrorse 2-celled anthers; those of the fourth series replaced by ovoid or cordate staminodes. Ovary sessile, free from the perianth, narrowed into the style; stigma obtuse. Fruit an oblong, ovoid or globose berry; pedicels not or slightly thickened; perianth quite deciduous. Seed with membranous testa. —DISTRIB. Species about 20, all tropical.

1. **Beilschmiedia fagifolia,** VAR. **Dalzellii,** *Meissn. in DC. Prodr.* v. 15, part 1 (1864) p. 64. A large tree; bark grey, scaly. Leaves coriaceous, 3½–5 by 1½–2 in., elliptic-lanceolate, acute, glabrous, smooth and shining above, closely reticulately veined beneath, base tapering; main nerves about 10 pairs, slender; petioles ⅜–⅝ in. long. Flowers in short axillary panicles; pedicels thickened in fruit. Perianth ⅙–⅕ in. long; segments ⅛ in. long or rather more, oblong, rounded at the tip, pubescent on both sides, gland-dotted. Ovary ovoid, pubescent, tapering into the style. Fruit 1¼–1½ in. long, ovoid. Fl. B. I. v. 5, p. 122. *Beilschmiedia fagifolia*, Bedd. Flor. Sylvat. t. 263; Talb. Trees, Bomb. ed. 2, p. 282; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367. *B. Roxburghiana*, Dalz. & Gibs. p. 222 (*not* of Nees).

This plant and *B. fagifolia* proper might be placed as varieties under *B. Roxburghiana*, Nees.

Dalzell without locality in Herb. Kew.! KONKAN: *Law!*; Matheran, *Cooke!*, *Woodrow*. S. M. COUNTRY: Párva Ghát, *Ritchie*, 696! KANARA: *Stocks!*; evergreen forests of N. Kanara Ghats, *Talbot*; Sonda, *Talbot*, 3658!; Ainshi Ghát, common, *Talbot*; Waguli, *Ritchie*, 1323!—DISTRIB. India (W. Peninsula).

3. **CINNAMOMUM,** Bl.

Evergreen trees or shrubs. Leaves opposite or alternate, usually 3-nerved. Flowers small, hermaphrodite or by abortion polygamous, in axillary and subterminal panicles, the females usually largest and sometimes with fewer parts. Perianth-tube short; lobes of limb subequal. Stamens 9 perfect, or by abortion fewer, those of the 2 outer rows with eglandular filaments and introrse 4-celled anthers, those of the third row with glandular filaments, the glands subsessile or stipitate, and extrorse 4 (rarely 2)-celled anthers, those of the fourth row replaced by shortly

stipitate cordate or sagittate staminodes. Ovary sessile, free from the perianth, narrowed into the style; stigma discoid or obscurely 3-lobed. Fruit a berry, resting on the spreading more or less enlarged perianth, the segments of which are wholly or partly deciduous, less often persistent. Seed with thin testa.—DISTRIB. Tropical and Subtropical Eastern Asia, Australia and the Pacific Islands; species perhaps 130.

Fruiting perianth ⅓ in. in diam.; fruit ½–⅔ in. long ..... 1. *C. zeylanicum.*
Fruiting perianth ⅔ in. in diam.; fruit 1 in. long ..... 2. *C. macrocarpum.*

1. **Cinnamomum zeylanicum,** *Blume, Bijdr.* (1825) p. 568. A moderate-sized evergreen tree; bark rather thick, smooth, pale; twigs often compressed; young parts glabrous except the buds which are finely silky. Leaves opposite or subopposite (rarely alternate), hard and coriaceous, 3–8 by 1½–3 in., ovate or ovate-lanceolate, subacute or shortly acuminate, glabrous and shining above, slightly paler beneath, base acute or rounded; main nerves 3–5 from the base or nearly so, strong, with fine reticulate venation between; petioles ½–1 in. long, flattened above. Flowers numerous, in silky-pubescent lax panicles usually longer than the leaves; peduncles long, often clustered, glabrous or pubescent; pedicels long. Perianth ⅛–¼ in. long; tube $\frac{1}{10}$ in. long; segments pubescent on both sides, oblong or somewhat obovate, usually obtuse. Fruit ½–⅔ in. long, oblong or ovoid-oblong, minutely apiculate, dry or slightly fleshy, dark purple, surrounded by the enlarged campanulate perianth which is ⅓ in. in diam. Fl. B. I. v. 5, p. 131; Wight, Icon. tt. 123, 134; Bedd. For. Man. in Flor. Sylvat. p. clxxxiv; Trim. Fl. Ceyl. v. 3, p. 440; Talb. Trees, Bomb. ed. 2, p. 283; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367; Prain, Beng. Pl. p. 898; Watt, Dict. Econ. Prod. v. 2, p. 324. *Cinnamomum zeylanicum* var. *Wightii,* Bedd. Flor. Sylvat. t. 262. *C. aromaticum,* Grah. Cat. p. 173; Dalz. & Gibs. Suppl. p. 74. *C. iners,* Grah. Cat. p. 173.—Flowers: Nov.–Mar. VERN. *Dálchini.*

Dalzell without locality in Herb. Kew.! KONKAN: Goa territory, *Cooke*!; Amboli Ghát, *Kanitkar*! DECCAN: ravines about Khandala, not common, *Graham.* KANARA: *Stocks*!; common in all evergreen forests of N. Kanara, very abundant in the Kumpta and Siddapur tálukas, *Talbot*; Kála naddi, *Ritchie,* 967!; Supa, *Talbot,* 45!—DISTRIB. India (Birma, W. Peninsula); Ceylon; cultivated in the Malay Islands and elsewhere in the tropics.

The bark which furnishes the Cinnamon of commerce is largely exported from Kanara. The tree is cultivated in Ceylon.

2. **Cinnamomum macrocarpum,** *Hook. f. Fl. B. I.* v. 5 (1886) p. 133. A moderate-sized evergreen tree; branches slender. Leaves 4½–7 by 1¾–2½ in., thinly coriaceous, elliptic-lanceolate or oblong-lanceolate, 3–5-nerved, the lateral nerves sometimes starting ⅔ in. above the base; petioles ½–1 in. long. Flowers in panicles shorter than the leaves. Fruiting perianth apparently fleshy, broadly infundibuliform, ⅔ in. in diam., shortly 6-toothed. Fruit 1 by ¾ in., globosely oblong. Talb. Trees, Bomb. ed. 2, p. 283; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367. *Cinnamomum iners,* Wight, Icon. t. 130.

KANARA: evergreen forests of N. Kanara, *Talbot*; Supa (N. Kanara), *Woodrow.*—DISTRIB. India (W. Peninsula).

Talbot (Trees, Bomb. l. c.) is doubtful as to whether this should not be considered a variety of *C. zeylanicum* with large fruit. The difference in the perianth would however seem to be a constant character, but the material in Herb. Kew. is very meagre.

4. MACHILUS, Nees.

Evergreen trees. Leaves alternate, clustered near the ends of the branches, penninerved. Flowers small, hermaphrodite, in axillary panicles. Perianth-tube short or obsolete; segments 6, subequal, persistent, reflexed in fruit. Stamens 9 perfect, those of the 2 outer rows with eglandular filaments and introrse 4-celled anthers, those of the third row with filaments which have 2 stipitate glands at the base and extrorse 4-celled anthers, those of the fourth row replaced by stipitate cordate staminodes. Ovary sessile, narrowed into the style; stigma discoid. Fruit a globose or ovoid berry, seated on the persistent perianth. Seed with thin testa.—DISTRIB. Species 15–20, Asiatic.

1. **Machilus macrantha,** *Nees, in Wall. Pl. As. Rar.* v. 2 (1831) p. 70. A large tree; young parts glabrous. Leaves coriaceous, 3½–7 by 1⅛–2½ in.; variable in shape, from oblong and rounded at both ends to elliptic-lanceolate and acute at both ends, glabrous, shining above, glaucous beneath, finely reticulately veined; main nerves 8–12 pairs, not conspicuous; petioles ¾–1¼ in. long. Flowers yellow, numerous, in panicles near the ends of the branches, often several panicles together 6–8 in. long, stout, puberulous. Perianth ¼ in. long, silky-pubescent inside and outside; tube very short; segments oblong or linear-oblong, subacute. Filaments hairy. Fruit ½–¾ in. in diam., smooth, dark-green dotted with white, ultimately becoming black. Fl. B. I. v. 5, p. 140; Dalz. & Gibs. p. 221; Wight, Icon. t. 1824; Bedd. Flor. Sylvat. t. 264; Trim. Fl. Ceyl. v. 3, p. 443; Talb. Trees, Bomb. ed. 2, p. 283; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367. *Machilus glaucescens,* Wight, Icon. t. 1825 (excl. syn.); Dalz. & Gibs. p. 221.—Flowers: Dec.–Mar. VERN. *Gulum.*

Dalzell without locality in Herb. Kew.! KONKAN: *Law*!; moist forests, *Talbot*; Wari jungles, *Stocks*!; Matheran, *Cooke*!, *H. M. Birdwood.* S. M. COUNTRY: Castle-rock, *Kanitkar*!; Párva Ghát, plentiful, *Dalzell & Gibson.* KANARA: *Stocks*!; throughout the Ghâts of N. Kanara in moist forests, *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

It is not improbable that there are 2 distinct species here as given by Wight. The berry of *M. glaucescens,* Wight, is said to be of the size of a gooseberry, that of *M. macrantha,* Nees, of the size of a large currant. The existing Herbarium material is insufficient to decide the question.

5. ALSEODAPHNE, Nees.

Evergreen trees. Leaves alternate, usually crowded towards the ends of the branchlets, often obovate, penninerved. Flowers hermaphrodite, in axillary and subterminal lax panicles. Perianth deeply divided; segments 6, subequal or the 3 outer smaller, deciduous. Stamens 9 perfect, those of the 2 outer rows with eglandular filaments and introrse 4-celled anthers, those of the third row with 2-glandular filaments and extrorse 4-celled anthers, those of the fourth row replaced by small sagittate staminodes. Fruit ellipsoid, seated on the truncate clavate end of the thick fleshy peduncle without any supporting perianth.—DISTRIB. Species about 15, tropical Asiatic.

1. **Alseodaphne semicarpifolia,** *Nees, in Wall. Pl. As. Rar.* v. 2 (1831) p. 72. A moderate-sized or sometimes a large much-branched

tree; bark dark-colored, smooth. Leaves coriaceous, crowded towards the ends of the branchlets, appearing whorled from crowding, 3–6 by 1¾–3½ in., elliptic-oblong or obovate, rounded at the apex, glabrous, very finely reticulately veined, usually glaucous beneath, base tapering; main nerves 6–8 pairs; petioles ⅜–¾ in. long. Flowers yellowish-green, in subumbellate cymes at the tips of the branches of large lax axillary and subterminal panicles; peduncles usually longer than the leaves, the lower portion naked; pedicels rather long. Perianth ⅛–⅙ in. long; segments elliptic-oblong, obtuse, subequal or the outer rather smaller. Fruit ½–¾ in. long, ellipsoid, blunt, smooth. Fl. B. I. v. 5, p. 144; Dalz. & Gibs. p. 222; Wight, Icon. tt. 1826, 1827; Bedd. Flor. Sylvat. t. 297; Trim. Fl. Ceyl. v. 3, p. 444; Talb. Trees, Bomb. ed. 2, p. 284; Woodr. in Journ, Bomb. Nat. v. 12 (1899) p. 367.—Flowers: July–Dec. VERN. *Phudgus*.

Dalzell without locality in Herb. Kew.! KONKAN: Matheran, *H. M. Birdwood*. KANARA: *Law*!; Yacombi (N. Kanara), *Woodrow*!; evergreen forests on the N. Kanara Ghâts from the coast inland, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

VAR. 1. *rufa*, Hook. f. Fl. B. I. v. 5, p. 144. The red color on the leaves of the solitary specimen in Herb. Kew. appears to have been caused by laterite dust adhering to them, a case of common occurrence on the laterite-topped hills of the Western Ghâts.

VAR. 2. *angustifolia*, Nees, in DC. Prodr. v. 15, part 1, p. 27. Leaves 3–5 by 1–1½ in., oblong-lanceolate, obtuse or subacute, glaucous beneath.

Dalzell without locality in Herb. Kew.! KANARA: *Stocks*!; near Yellapur, common, *Talbot*. Abundant in Ceylon, where (*fide* Trimen) it is one of the best timber-trees in the forests of that island.

6. **ACTINODAPHNE,** Nees.

Evergreen shrubs or trees. Leaves almost whorled, penninerved or 3-nerved. Flowers small, dicœcious, in axillary or lateral dense sessile or pedunculate fascicles or umbels; bracts imbricating, caducous (not whorled). Perianth-tube short; segments 6, subequal. MALE FLOWERS: Stamens 9 perfect (rarely only 6), those of the 2 outer rows with eglandular filaments, the third row sometimes obsolete, if present with 2-glandular filaments; anthers of all three rows introrse, 4-celled. Ovary reduced and empty or obsolete. FEMALE FLOWERS: Staminodes 9. Ovary free; style longish; stigma dilated. Fruit a berry resting on the enlarged hardened flat spreading or concave perianth-tube. Seed with thin testa.—DISTRIB. Species 50, Eastern Asia and Malaya.

1. **Actinodaphne Hookeri,** *Meissn. in DC. Prodr.* v. 15, part 1 (1864) p. 218 (exclud. var. *longifolia*). A medium-sized tree. Leaves coriaceous, in 2 whorls of 3 each, 4–7 by 1¾–2½ in., penninerved, elliptic-lanceolate, finely acuminate, the mature leaves glabrous above and usually clothed with thin tomentum beneath, the young leaves densely silky with long tawny hairs, base usually acute; main nerves 6–10 pairs; petioles ½–1 in. long, silky-pubescent. Flowers dicœcious, yellowish, from the naked branches, the males in clusters of about 8, the females umbellate or subracemose on very short stout peduncles; pedicels clothed

with tawny hairs, those of the female flowers longer than the male. Perianth densely clothed with tawny hairs; segments elliptic or ovate. Stamens 9 in the male flowers, reduced in the female to strap-shaped antherless staminodes, of the same number as the male stamens or less; filaments thickly covered with whitish hairs, the interior row of 3 with 2 somewhat reniform glands at the base of each filament, the glands in the male flowers slightly stalked, those of the female sessile. Style rather thick; stigma large, mushroom-shaped, oblique. Berry $\frac{1}{3}$–$\frac{1}{2}$ in. long, ellipsoid, red when ripe, seated on the cup-shaped enlarged perianth-tube. Fl. B. I. v. 5, p. 149; Talb. Trees, Bomb. ed. 2, p. 284; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367; Watt, Dict. Econ. Prod. v. 1, p. 104. *Actinodaphne lanceolata*, Dalz. & Gibs. p. 312. *A. angustifolia*, Nees, in Wall. Pl. As. Rar. v. 3 (1832) p. 31; Wight, Icon. t. 1841. *Tetranthera lanceæfolia*, Grah. Cat. p. 174 (*not* of Roxb.).—Flowers: Nov. VERN. *Pisa.*

Dalzell without locality in Herb. Kew.! KONKAN: *Law*!; Matheran, *Otto Kuntze*!, *Cooke*! DECCAN: Mahableshwar, very common, *Cooke*!, *H. M. Birdwood, Dalzell & Gibson, Woodrow.* KANARA: *Stocks*!; evergreen forests of N. Kanara, *Talbot.*—DISTRIB. India (W. Peninsula).

7. **LITSEA,** Lamk.

Evergreen (rarely deciduous) trees or shrubs. Leaves alternate (rarely opposite or subopposite), penninerved (rarely 3-nerved from the base); buds naked or scaly. Flowers small, diœcious, usually umbellate; umbels 4–6 (rarely more)-flowered, sessile or shortly pedunculate, axillary or in the scars of fallen leaves; bracts involucrate, 4–6 (rarely more) to an involucre, concave, coriaceous or membranous. Perianth-tube ovoid, campanulate, or very short; lobes of limb 6 or 4 (rarely fewer or more), equal or unequal or in a few wanting. MALE FLOWERS: Stamens 9 or 12 in 3-merous, 6 in 2-merous flowers (sometimes by abortion fewer than 6 and in a few more than 12); filaments of the first and second rows usually eglandular, those of the third and fourth (if present) 2-glandular; anthers all introrse, 4-celled. Ovary minute, empty or obsolete (very rarely perfect). FEMALE FLOWERS: Staminodes 9 or 12, or in 2-merous flowers 6 (rarely more than 12). Ovary enclosed in the perianth-tube or free; style short or long; stigma usually irregularly lobed. Fruit a drupe or berry resting on the unchanged perianth or partly clasped at the base by the often much enlarged discoid or cupular perianth-tube. Seed with thin testa.—DISTRIB. Tropical and Eastern Asia, Australasia, the Pacific Islands, rare in Africa and America; species 140.

Leaves persistent, penninerved.
- Perianth-segments incomplete or wanting; tube hardly enlarged in fruit; stamens numerous, often 20.
  - Leaves thick, finely tomentose beneath; umbels solitary, many-flowered ..... 1. *L. tomentosa.*
  - Leaves thin, glabrous beneath or nearly so; umbels corymbose or racemose, few-flowered..... 2. *L. chinensis.*
- Perianth-segments 6; tube enlarged, cup-shaped in fruit; stamens about 12.
  - Leaves glaucous beneath; filaments glabrous ..... 3. *L. Stocksii.*
  - Leaves rusty-tomentose beneath; filaments hairy..... 4. *L. Wightiana.*

Leaves 3-nerved; perianth-segments usually 4, deciduous..... 5. *L. zeylanica.*

1. **Litsea tomentosa,** *Heyne, in Wall. Cat.* (1828) 2550. A moderate-sized tree, densely and softly tomentose except the upper side of the leaves; bark thin, smooth. Leaves coriaceous, crowded towards the ends of the branches, 4–9 by 2–3¼ in., elliptic-lanceolate or obovate, shortly acuminate, glabrous above, finely tomentose and yellowish-white beneath, base acute; main nerves 10–15 pairs, prominent beneath; petioles ¼–½ in. long. Flowers pale-yellow, in solitary pedunculate many-flowered umbellate heads, globose before expansion; peduncles reaching ½ in. long, hairy, drooping; pedicels ¼ in. long, hairy; bracts 4, broadly ovate or suborbicular, concave, tomentose. Perianth-tube very short, hairy outside; segments varying from 0–6 (commonly 0). Stamens 18–20; filaments long, slender, densely villous, the glands with long stalks. Staminodes of the female long, strap-shaped, numerous. Fruit ⅜–½ in. in diam., globose, black when ripe. Fl. B. I. v. 5, p. 157; Trim. Fl. Ceyl. v. 3, p. 449; Talb. Trees, Bomb. ed. 2, p. 285; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367. *Tetranthera apetala*, Grah. Cat. p. 174 (*not* of Roxb.); Dalz. & Gibs. p. 222. *Tetranthera tomentosa*, Roxb. ex Wall. Cat. (*l. c.*); Wight, Icon. t. 1834.—Flowers: Nov.–Dec. VERN. *Chikna.*

Dalzell without locality in Herb. Kew.! KONKAN: *Law*!; Vingorla, *Dalzell & Gibson*; evergreen forests, *Talbot*; Parel Hill, Bombay, *Graham.* DECCAN: Rotunda Ghát, Mahableshwar, *Cooke*!, *H. M. Birdwood.* S. M. COUNTRY: Castlerock, *Cooke*!, *Bhiva*!, *Woodrow.* KANARA: *Stocks*!; in evergreen forests, *Talbot*—DISTRIB. India (W. Peninsula); Ceylon.

2. **Litsea chinensis,** *Lam. Encyc. Méthod.* v. 3 (1789) p. 574. A small or moderate-sized evergreen, very variable tree; inner bark viscid; branchlets, inflorescence and underside of leaves more or less pubescent. Leaves 5–8½ by 2¾–3½ in., thinly coriaceous, ovate or elliptic-lanceolate, usually obtuse, glabrous above, pale beneath, base acute; main nerves 8–12 pairs with finely reticulate venation between; petioles ½–1 in. long. Flowers white or yellowish, globose, ¼ in. in diam. before expansion, in axillary stalked corymbose or racemose few-flowered umbels. Perianth-tube long, silky; segments usually 0. Stamens reaching 20 or more in number; filaments clothed with long soft hairs, the glands with long stalks. Fruit globose, ¼ in. in diam., purple when ripe. Lamarck's name has long priority over Persoon's. Trim. Fl. Ceyl. v. 3, p. 449. *Litsæa sebifera*, Pers. Syn. v. 2 (1807) p. 4; Hook. f. Fl. B. I. v. 5, p. 157; Talb. Trees, Bomb. ed. 2, p. 284; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367; Prain, Beng. Pl. p. 902; Watt, Dict. Econ. Prod. v. 5, p. 83. *Tetranthera apetala*, Roxb. Cor. Pl. v. 2, p. 25, t. 147.—Flowers: Mar.–July. VERN. *Maidlakdi.*

S. M. COUNTRY: Belgaum, *Ritchie*, 1317! KANARA: *Ritchie*, 1320!, *Stocks*!; Southern Ghâts of the Kumpta and Siddapur tâlukas, *Talbot*; Yellapur, *Talbot*!; Yacombi, *Woodrow.*—DISTRIB. Throughout the hotter parts of India; Ceylon, Malay Islands, Australia.

The wood is excellent, durable, and not attacked by insects; the oil from the berries is used in rheumatism and the mucilaginous bark is largely used in native medicine. See Watt, Dict. Econ. Prod. l. c.

3. **Litsea Stocksii,** *Hook. f. Fl. B. I.* v. 5 (1886) p. 176. A small tree. Leaves coriaceous, alternate or subopposite, 4–8 by 2–3 in., elliptic-oblong, obtuse or subacute, glabrous above, glaucous beneath,

with slightly revolute margins, penninerved, base acute; main nerves 8–12 pairs, strong, the midrib and nerves glabrous with a slightly yellowish tinge when fresh; petioles ¼–½ in. long, stout, glabrous. Heads of flowers in racemes axillary and from the old scars, the heads consisting of 4–8 flowers (very often 7, six round a central one); peduncles and pedicels pubescent, the latter increasing in fruit; bracts 4–6, concave, pubescent. Perianth hairy, 6- or occasionally in the female 7–8-divided. Stamens 12; filaments glabrous; glands stipitate. Style sublobate. Fruit ½ in. long, ellipsoid, when young green speckled with white, when ripe dark-purple, supported on the cup-shaped perianth-tube. Talb. Trees, Bomb. ed. 2, p. 285; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367.—Flowers: Sept.–Oct. *Tetranthera lanceæfolia*, Grah. Cat. p. 174, cited in Fl. B. I. l. c. as a synonym for this, is most certainly *Actinodaphne Hookeri* with red (not purple) fruit and which is "next to the *Jambool* the commonest tree at Mahableshwar."

KONKAN: *Law*! DECCAN: Mahableshwar, not common, *Cooke*!, *Gibson*!, *H. M. Birdwood*, *Woodrow*. KANARA: *Stocks*!; Chandwar, *Ritchie*, 1316!; common on the Ghâts from Ainshi southwards, *Talbot*.—DISTRIB. India (W. Peninsula), apparently endemic.

4. **Litsea Wightiana,** *Benth. & Hook. f. Gen. Pl.* v. 3 (1880) p. 162. A large tree; branchlets, petioles, underside of leaves, and inflorescence clothed with dense rust-colored tomentum. Leaves very variable in size and breadth, coriaceous, alternate, penninerved, 3–7 by 1½–2¾ in., elliptic or elliptic-lanceolate, obtuse, acute or acuminate, glabrous and light-green above, usually brownish or purplish beneath, base acute; main nerves 8–15 pairs, impressed above, prominent beneath; petioles ⅓–⅔ in. long, stout. Flowers in suberect or spreading racemes 1–4 in. long; rhachis stout; pedicels ¼–⅓ in. long, stout; bracts 4, coriaceous. Perianth-tube turbinate, silky-tomentose; segments silky-tomentose. Stamens 12; filaments hairy. Stigma discoid. Fruit ⅔ in. long, ellipsoid, the base enclosed in the cup-shaped more or less lobed perianth. Fl. B. I. v. 5, p. 177; Talb. Trees, Bomb. ed. 2, p. 285; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367. *Cyclicodaphne Wightiana*, Nees, in Wall. Pl. As. Rar. v. 2, p. 68 & v. 3, p. 31; Dalz. & Gibs. p. 222; Wight, Icon. t. 1833. *Tetranthera Wightiana*, Wall. Cat. 2557; Bedd. Flor. Sylvat. t. 293.—Flowers: Aug.–Nov.

DECCAN: Mahableshwar, below Bombay Point, *Symonds* ex *H. M. Birdwood*. KANARA: Southern Ghâts of N. Kanara in evergreen forests, common in the forests near the Falls of Gairsoppa, *Talbot*.—DISTRIB. India (W. Peninsula), apparently endemic.

5. **Litsea zeylanica,** *Nees, Cinnamom. Disput.* (1823) p. 58. A small or moderate-sized tree; bark thin, smooth, grey; branchlets slender. Leaves numerous, crowded towards the ends of the branches, 2½–6 by 1¼–2¼ in., elliptic-lanceolate, thinly coriaceous, obtusely or acutely acuminate, finely reticulately veined and more or less glaucous beneath, 3-nerved from a little above the acute base; petioles ½–1 in. long. Flowers in small, sessile, clustered, 4–5-flowered umbels; bracts silky. Perianth hairy; tube rather long; segments 4, acute, deciduous. Fruit either oblong-ellipsoid apiculate, ½ in. long, or globose not apiculate, ⅓ in. in diam., dark-purple when ripe (*Trimen*), seated on the disciform perianth-tube. Fl. B. I. v. 5, p. 178; Dalz. & Gibs. p. 223; Wight,

Icon. tt. 132 and 1844; Bedd. Flor. Sylvat. t. 294; Trim. Fl. Ceyl. v. 3, p. 454; Talb. Trees, Bomb. ed. 2, p. 286; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367; Prain, Beng. Pl. p. 902; Watt, Dict. Econ. Prod. v. 5, p. 85.—Flowers: Oct.–Jan. VERN. *Kánvel*; *Chirchira.*

Dalzell without locality in Herb. Kew.! KONKAN: moist forests, *Talbot.* DECCAN: Mahableshwar, *Cooke!*, *Woodrow*, *H. M. Birdwood.* S. M. COUNTRY: Párva Ghát, *Dalzell & Gibson.* KANARA: *Stocks!*; in moist forests, common, *Talbot.*—DISTRIB. India (Bhotan and the Khasia Mountains, Silhet, Chittagong, W. Peninsula); Ceylon, Sumatra, Java.

8. **CASSYTHA,** Linn.

Filiform twining parasites adhering to their host by suckers. Leaves consisting of minute scales or 0. Flowers small, hermaphrodite, sometimes dimorphic, spicate, capitate or racemose; bracteoles 3. Perianth-tube short and globose, or (often in the same species) as long as the limb and turbinate; segments 6, the 3 outer smaller. Perfect stamens 9 or 6; filaments of first row eglandular with introrse 2-celled anthers, those of the second row similar or sometimes reduced to staminodes, those of the third row with 2-glandular filaments and extrorse anthers, those of the fourth row replaced by sessile or stipitate staminodes. Ovary globose, free in flower, closely covered by the enlarged perianth in fruit; stigma subsessile, small or capitate. Fruit a small drupe enclosed in the succulent perianth-tube and crowned by the perianth-limb. Seed with thin testa; cotyledons ultimately confluent.—DISTRIB. Species 15, of which 1 is widely spread through the Tropics, 1 or 2 S. African, 1 from Borneo, and the rest Australian.

1. **Cassytha filiformis,** *Linn. Sp. Pl.* (1753) p. 35. A parasitic herbaceous leafless plant; stems very long, cord-like, twined and matted together, branched, glabrous or pubescent, dark green. Flowers small, sessile, in lax lateral divaricate spikes ½–2 in. long; bracteoles small, rounded, ciliate. Perianth twice as long as the bracteoles; tube short; segments 6 in 2 rows, the 3 outer segments short, rounded, ciliate, the inner oblong, acute, concave, valvate. Fruit about ¼ in. in diam., white, globose, smooth, enclosed in the fleshy perianth-tube and crowned with the erect perianth-segments. Fl. B. I. v. 5, p. 188; Grah. Cat. p. 175; Dalz. & Gibs. p. 223; Wight, Icon. t. 1847; Trim. Fl. Ceyl. v. 3, p. 455; Talb. Trees, Bomb. ed. 2, p. 286; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367; Prain, Beng. Pl. p. 904; Watt, Dict. Econ. Prod. v. 2, p. 226.—Flowers: Sept. VERN. *Amarvel.*

Throughout the Presidency often growing on *Ipomœa biloba* near the sea-coast, *Talbot.* KONKAN: common in hedges, *Graham*, *Dalzell & Gibson*; Shrivardhan, *Kanitkár!*—DISTRIB. Throughout India near the coast; Ceylon, Arabia, Mascarene Islands, Tropical East Asia and Islands, Australia, Polynesia, Tropical Africa, and America.

ORDER CX. THYMELEÆCEÆ.

Shrubs or small trees with tough fibrous bark. Leaves alternate or opposite, simple, quite entire. Flowers usually hermaphrodite, in axillary or terminal heads, umbels, clusters, or racemes. Perianth regular, tubular or campanulate, often corolline, frequently with a ring of scales

or hairs at the mouth; lobes 4–5, imbricate in bud. Stamens as many or twice as many as the perianth-lobes (rarely half as many), adnate to the perianth-tube, those opposite the lobes usually attached above the alternate ones; filaments short, rarely as long as the anthers; anthers erect, 2-celled, the cells parallel, dehiscing longitudinally. Disk annular, cupular, scaly or obsolete. Ovary superior, 1 (rarely 2)-celled; ovule 1 in each cell, anatropous, pendulous from near the apex of the cell; style short or long, terminal or eccentric; stigma capitate. Fruit a small berry, drupe, or nut (rarely capsular). Seed solitary or 1 in each cell, pendulous or lateral; albumen fleshy, copious or 0; cotyledons fleshy, usually thick; radicle short, superior.—DISTRIB. Genera nearly 40, in Africa, Australia, Asia, Mediterranean region, America; species about 360.

1. LASIOSIPHON, Fresen.

Shrubs. Leaves opposite or scattered. Flowers hermaphrodite, in dense sessile or pedunculate heads; bracts broad. Perianth often silky-pubescent; tube cylindric, circumscissile above the ovary; lobes 5, spreading, with 5 small scales alternating with them. Stamens 10, attached to the throat below the scales in 2 rows, the upper or all shortly exserted; filaments very short; anthers oblong or linear. Disk 0 or shortly annulate. Ovary superior, 1-celled; ovule solitary, pendulous; style long, filiform; stigma capitate. Fruit small, dry, included in the perianth-tube; pericarp membranous. Seed with a crustaceous testa.—DISTRIB. Tropical and S. Africa, Madagascar, Tropical Asia; species about 25.

1. **Lasiosiphon eriocephalus,** *Decaisne, in Jacq. Voy. Bot.* (1844) p. 148. A much-branched shrub, sometimes a small tree, with mottled bark. Leaves subsessile, 2–3 by $\frac{3}{4}$–1 in., oblong-lanceolate, acute, apiculate, glaucous and glabrous above, glabrous or silky beneath, base acute; petioles very short. Flowers yellow, nearly sessile, in erect dense terminal heads 1–$1\frac{1}{2}$ in. in diam., surrounded at the base by an involucre of large imbricate elliptic-oblong, acute, silky-villous deciduous bracts. Perianth densely silky-villous; tube $\frac{3}{8}$ in. long; lobes $\frac{1}{10}$–$\frac{1}{8}$ in. long, oblong, obtuse, flat, with a linear usually 2-fid scale at each division. Anthers almost sessile. Fruit $\frac{3}{8}$–$\frac{1}{2}$ in. long, ellipsoid-oblong, pointed, enclosed in the perianth. Fl. B. I. v. 5, p. 197; Bedd. For. Man. in Flor. Sylvat. p. clxxix & Anal. Gen. t. 25, fig. 2; Trim. Fl. Ceyl. v. 3, p. 459; Talb. Trees, Bomb. ed. 2, p. 286; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 367; Watt, Dict. Econ. Prod. v. 4, p. 589. *Lasiosiphon speciosus,* Decne. l. c. p. 147, t. 150; Dalz. & Gibs. p. 221. *Gnidia eriocephala,* Meissn. in Regensb. Denkschr. v. 3 (1841) p. 292; Grah. Cat. p. 176; Wight, Icon. t. 1859.—Flowers: Dec.–May. VERN. *Rametha.*

Dalzell without locality in Herb. Kew.! KONKAN: *Law!, Talbot*; Matheran, *Cooke!, H. M. Birdwood.* DECCAN: Khandala, *Dalzell & Gibson*; Karli, *Dalzell & Gibson*; Mahableshwar, common, *Cooke!, H. M. Birdwood.* S. M. COUNTRY: Belgaum hills, *Ritchie,* 657! KANARA: common on the Supa Ghâts of N. Kanara, *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

The bark is used by the hill-tribes for tying up bundles, and has been recommended for use as a paper-making material. It is a powerful vesicant and frequently employed to poison fish in the small hill-streams. See Watt, Dict. Econ. Prod. l. c.

Order CXI. ELÆAGNACEÆ.

Trees or shrubs with copious silvery or brown scales. Leaves alternate or opposite, quite entire; stipules 0. Flowers small, regular, hermaphrodite or diœcious, axillary (rarely from the leafless nodes), fasciculate, spicate or racemose; bracts small, deciduous. Perianth in the hermaphrodite or female flowers tubular, constricted above the ovary, persistent below, deciduous above; limb 2–4-lobed (rarely truncate). Stamens in hermaphrodite flowers adnate to the throat of the perianth, in male flowers adnate to the base of the perianth, 4 alternate with, or 8 both opposite to and alternate with the perianth-lobes; filaments free, usually short; anthers oblong, 2-celled, the cells parallel, contiguous, dehiscing longitudinally; staminodes in female flowers 0. Ovary free, 1-celled; ovule solitary, erect, basal, anatropous; style terminal, linear or dilated above, oblique; stigma lateral. Fruit a nut closely covered by the thickened berry-like perianth-base; pericarp membranous. Seed erect; testa hard; albumen scanty or 0; cotyledons thick, fleshy; radicle inferior, very short.—Distrib. North temperate and tropical regions; genera 3; species 16.

1. ELÆAGNUS, Linn.

Trees or shrubs often silvery with a scaly or stellate tomentum. Flowers hermaphrodite, axillary, shortly petiolate, solitary or 2–3-nate, or sometimes fasciculate on short leafless or leafy branchlets; bracts 0. Perianth with oblong or globose persistent base narrowed above the ovary, then campanulate or infundibuliform, valvately 4-fid at the apex, deciduous, usually with a prominent ring above the constriction within. Stamens 4, on the mouth of the perianth; filaments short. Ovary 1-celled; style linear, included, slightly dilated above; stigma lateral. Fruit enclosed in the persistent accrescent berried or rarely dry perianth-base; pericarp thinly membranous. Seed with hard shining testa; albumen 0 or very scanty.—Distrib. S. Europe, Temperate and Tropical Asia, Australia, N. America; species about 12.

1. **Elæagnus latifolia,** *Linn. Sp. Pl.* (1753) p. 121. A large, much-branched, usually scandent shrub, often running over high trees; trunk sometimes 4 in. or more in diam.; young shoots scurfy with rust-colored shining scales; stems and branches more or less spinous; bark smooth with corky excrescences. Leaves numerous, variable, thin or coriaceous, 1½–4 by ⅞–2 in., from broadly elliptic to elliptic-lanceolate, obtuse, acute or acuminate, the upper surface pale-green clothed with small whitish scurfy scales, the lower surface glistening silvery-white, margins more or less revolute, base acute or rounded; petioles ¼–⅜ in. long, scaly. Flowers usually many in a cluster, straw-colored; pedicels clothed with silvery scales. Perianth ⅓ in. long, covered with silvery scales; lobes ovate, acute, ⅛ in. long, spreading. Style hairy. Fruit nearly 1 in. long, ellipsoid, with 8 strong blunt ribs, crowned by the top of the perianth, pinkish, with small whitish scabrous spots; mesocarp succulent, edible; putamen white, clothed inside with white wool. Seed ¾ in. long. Fl. B. I. v. 5, p. 202; Wight, Icon. t. 1856; Bedd.

For. Man. in Flor. Sylvat. p. clxxx; Trim. Fl. Ceyl. v. 3, p. 461; Talb. Trees, Bomb. ed. 2, p. 287; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368; Prain, Beng. Pl. p. 908; Watt, Dict. Econ. Prod. v. 3, p. 205. *Elæagnus Kologa*, Schlecht. in DC. Prodr. v. 14, p. 611; Dalz. & Gibs. p. 224. *E. conferta*, Roxb. Fl. Ind. v. 1, p. 440; Grah. Cat. p. 178.—Flowers: Nov.–Jan. VERN. *A'mbgul.*

Dalzell without locality in Herb. Kew.! KONKAN: *Law*!; all along the Ghâts, *Graham*; Matheran, *Cooke*!, *H. M. Birdwood.* DECCAN: Mahableshwar, *Graham, Cooke*!, *H. M. Birdwood, Woodrow*; Khandala, *Graham.* S. M. COUNTRY: Párva Ghât, *Ritchie*, 1330! KANARA: throughout N. Kanara, usually in or near evergreen forests, *Talbot.*—DISTRIB. Widely distributed throughout the hilly parts of India; Ceylon; Malay Islands, China.

The fruit is edible and sold in the bazaars on the hills. It has a subacid flavor somewhat resembling that of a red currant.

ORDER CXII. LORANTHACEÆ.

Evergreen shrubs usually parasitic on the branches of trees; stems much-branched, often jointed. Leaves usually opposite, coriaceous, entire, sometimes absent; stipules 0. Flowers hermaphrodite or 1-sexual, racemose, spicate, capitate or fasciculate; bracts usually scale-like; bracteoles usually 2. Perianth simple or double; sepals or simple perianth when sepaloid adnate to the ovary; limb annular or cupular, entire or shortly toothed; petals or simple perianth-segments when petaloid 3–8 (rarely 2), valvate, free or more or less connate in a tube or in a sheath split on the upper side. Stamens as many as and opposite to the corolla-lobes, usually adnate to them; filaments filiform; anthers usually 2-celled. Ovary inferior, at first apparently solid, at length 1-celled; óvule solitary, erect, adnate throughout to the walls of the ovary; style short or long; stigma simple. Fruit a 1-seeded berry or drupe. Seed adnate throughout to the pericarp; albumen fleshy or 0; embryo straight; radicle superior.—DISTRIB. Chiefly tropical; genera 13; species about 500.

Flowers hermaphrodite	1. LORANTHUS.
Flowers 1-sexual	2. VISCUM.

The Order is usually placed under *Monochlamydeæ*, though some botanists include it among the *Corollifloræ*. The albumen of the seed is remarkable, being frequently toothed at the apex. In the plates to the paper on the Development of the Ovula of *Loranthus* and *Viscum*, read by Mr. W. Griffith before the Linnean Society on June 21st, 1836 [published in Transactions, v. 18 (1841) p. 71], several figures are given which exhibit this curious character. Mr. Talbot has examined specimens of the fresh fruit of many of the Bombay *Loranthi*, and has described their albumen in his list of Trees, Shrubs, and Woody Climbers, ed. 2 (1902). I have quoted Mr. Talbot's descriptions *in extenso*.

1. LORANTHUS, Linn.

Branched shrubs, parasitic on the branches of trees. Leaves opposite (rarely alternate), entire, usually thick and fleshy or coriaceous. Flowers hermaphrodite, usually colored, spicate, racemose or cymose, axillary or on old nodes (rarely terminal); bracts concave or oblique, cupular; bracteoles 2, free or connate with the bract or 0. Perianth double. Calyx-tube adnate to the ovary; limb short, truncate or 4–6-toothed,

or obsolete. Petals 4–6, valvate, free or more or less connate in a tube with spreading tips, often split down one side. Stamens 4–6, adnate to the petals; filaments filiform or thickened; anthers ovate-oblong or linear, adnate or versatile, the cells parallel. Disk 0. Ovary inferior, 1-celled; ovule solitary; style columnar, filiform (rarely twisted); stigma entire, terminal, obtuse or capitate. Fruit a berry or drupe, globose, ovoid or oblong. Seed adnate to the pericarp; testa 0; albumen copious, fleshy or 0; embryo usually fleshy.—DISTRIB. Mostly tropical; species about 350.

Flowers without a pair of bracteoles within the bract.
  Bract solitary, not forming an involucre nor cup.
    Corolla 4-cleft.
      Flowers in glabrous spikes; anthers oblong, continuous with the filaments, distinctly 2-celled; berry ovoid.
        Flowers $\frac{1}{6}$–$\frac{1}{5}$ in. long ..... 1. *L. Wallichianus.*
        Flowers $\frac{1}{2}$–$\frac{3}{4}$ in. long ..... 2. *L. obtusatus.*
      Flowers in axillary clusters or racemose, mealy-tomentose; calyx scarcely any, truncate; anthers narrow, indistinct; fruit pyriform.
        Flowers pedicellate in subracemose fascicles, 1 in. long ..... 3. *L. Scurrula.*
        Flowers subsessile, 1–3 together, $\frac{5}{8}$ in. long..... 4. *L. Stocksii.*
    Corolla 5-cleft.
      Flowers villous or pubescent; fruit ovoid; calyx slightly toothed ..... 5. *L. gibbosus.*
      Flowers glabrous.
        Corolla-lobes longer than the tube, spirally coiled... 6. *L. elasticus.*
        Corolla-lobes shorter than the tube, not spirally coiled.
          Leaves less than 2 in. long, cuneate at base; flowers in axillary fascicles..... 7. *L. cuneatus.*
          Leaves more than 2 in. long, rounded at base; flowers in unilateral racemes..... 8. *L. longiflorus.*
  Bracts connate, forming a small cup below the ovary; young branches 3-gonous ..... 9. *L. trigonus.*
  Bracts forming a large campanulate toothed involucre ..... 10. *L. lageniferus.*
Flowers with a pair of bracteoles within the bract.
  Corolla less than 1 in. long, cleft to below the middle, straight ..... 11. *L. capitellatus.*
  Corolla 1 in. and more long, cleft $\frac{1}{3}$ the way down, slightly curved ..... 12. *L. loniceroides.*

1. **Loranthus Wallichianus,** *Schultes f. Syst. Veg.* v. 7 (1829) p. 100. Branches terete; bark pale. Leaves opposite and alternate, $2\frac{1}{2}$–4 by $1\frac{1}{2}$–$2\frac{1}{4}$ in., coriaceous, elliptic, obtuse, penninerved, glabrous, base acute; petioles $\frac{1}{8}$–$\frac{3}{8}$ in. long. Flowers in axillary fasciculate slender glabrous racemes 1–3 in. long; pedicels $\frac{1}{10}$–$\frac{1}{8}$ in. long; bract represented by a lateral spoon-shaped ciliate expansion of the pedicel. Flower (including calyx and corolla) $\frac{1}{6}$–$\frac{1}{5}$ in. long. Calyx globose, about $\frac{1}{20}$ in. long; limb annular, almost obsolete. Corolla red; tube somewhat angular; limb 4-fid, the lobes ovate, acute. Fruit $\frac{1}{4}$ in. long, ovoid, rugose. Fl. B. I. v. 5, p. 204; Dalz. & Gibs. p. 109; Wight, Icon. t. 143; Talb. Trees, Bomb. ed. 2, p. 289; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Apr.–July.

KONKAN: *Law*! S. M. COUNTRY: Párva Ghát, *Dalzell & Gibson*; Belgaum, *Ritchie*, 1074! KANARA: Karwar, *Woodrow*; parasitic on *Memecylon edule* and other trees, common in the forests near Karwar, *Talbot.*—DISTRIB. India (W. Peninsula), apparently endemic.

2. **Loranthus obtusatus,** *Wall. Cat.* (1828) 526. Branches stout, lenticellate; bark pale. Leaves subopposite, coriaceous, 2½–4½ by 1½–3 in., broadly ovate or elliptic, obtuse, entire, waved, glabrous, shining, the midrib in young leaves usually red; petioles ½ in. long. Flowers (including calyx and corolla) ½–¾ in. long, in axillary many-flowered racemes which are solitary or 2–3 together and shorter than the leaves; pedicels ⅛–⅙ in. long, slender, red; bract oblique, ovate, concave, 1/16 in. long. Calyx ⅛ in. long, somewhat tubercular outside; tube subcylindric, slightly constricted at the mouth; limb very short but distinct. Corolla red outside, dark-purple inside; tube with 4 prominent angles, readily splitting along the angles; limb 4-cleft, one of the divisions deeper than the others, the lobes obovate-oblong, rounded at the apex, thick and fleshy. Stamens 4; anthers black; pollen whitish. Style 4-sided; stigma large, capitate. Berry ⅙ in. long, ovoid, truncate at the apex, somewhat tuberculate. Fl. B. I. v. 5, p. 205; Grah. Cat. p. 86; Dalz. & Gibs. p. 109; Talb. Trees, Bomb. ed. 2, p. 289; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Feb.–May.

KONKAN: Ghâts, *Talbot.* DECCAN: Mahableshwar, *Cooke!, Woodrow!;* Rotunda Ghât, Mahableshwar, *Graham.* KANARA: N. Kanara Ghâts on *Xylia dolabriformis,* Myristica attenuata, and other trees, *Talbot;* Supa Ghâts in deciduous forests, *Talbot.* —DISTRIB. India (W. Peninsula), apparently endemic.

3. **Loranthus Scurrula,** *Linn. Sp. Pl.* ed. 2 (1762) p. 472. Much-branched; branches terete, copiously lenticellate; young parts rusty-tomentose. Leaves opposite, coriaceous, 1½–3 by 1–2 in., broadly elliptic, obtuse, glabrous or nearly so above, more or less rusty-tomentose beneath, penninerved, base rounded or subacute, sometimes subcordate: petioles ¼–½ in. long. Flowers (including calyx and corolla) variable in length, ½–1 in. long, in shortly pedunculate rusty- or grey-tomentose, axillary short subracemose fascicles (often 2 or more from an axil); buds terete, clavate at tip; pedicels usually short, slender; bract 1/10 in. long, ovate, concave, oblique, tomentose, subciliate. Calyx somewhat wedge-shaped, grey- or rusty-tomentose, 1/10–⅛ in. long; limb truncate, entire, very short. Corolla slender, usually curved, terete, greenish-yellow, tomentose; lobes 4, narrowly elliptic, acute. Filaments long, flattened, purple; anthers ⅛ in. long, narrowly linear. Stigma capitate, fusiform. Berry ¼–⅜ in. long, pyriform, tomentose. Albumen pink, obtusely quadrangular at the radicle-end, the other end terminating in a hard elongated point, surrounded with a green sticky layer; embryo green, fusiform; radicle not distinguishable from the tigellus (*Talbot*). Fl. B. I. v. 5, p. 208; Trim. Fl. Ceyl. v. 3, p. 465; Talb. Trees, Bomb. ed. 2, p. 289; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368; Prain, Beng. Pl. p. 910. *Loranthus buddleoides,* Desrouss. in Lamk. Encycl. Méthod. v. 3 (1789) p. 600; Grah. Cat. p. 86; Dalz. & Gibs. p. 110.—Flowers: Oct.–Feb.

KONKAN: *Law!, Stocks!;* Savantvadi, *Kanitkar!* DECCAN: Warra below Mahableshwar, *Cooke!;* Panchgani, *Woodrow!;* Nasik, *Bhiva!* S. M. COUNTRY: Belgaum, *Ritchie,* 337!; Ramghât, *Gibson!* KANARA: common in N. Kanara, often growing on Leea sambucina, Dillenia pentagyna, and Pterocarpus Marsupium, *Talbot;* Nilkund Ghât, *Talbot,* 260!—DISTRIB. Common throughout India; Ceylon.

4. **Loranthus Stocksii,** *Hook. f. Fl. B. I.* v. 5 (1886) p. 213. Stems and branches terete, more or less lenticellate. Leaves sessile or

nearly so, opposite, ¾-2 by ½-1½ in., elliptic-oblong, obtuse, clothed when young with buff mealy tomentum, base rounded or subcordate; nerves few, obscure. Flowers axillary, solitary or 2–3 together, in rusty-tomentose fascicles which are sessile or on very short peduncles; bracts ¼ in. long, oblong, obtuse, tomentose or pubescent with orange-red hairs. Calyx ⅛ in. long, subglobose, densely pubescent with short orange-red hairs; limb not produced above the ovary, densely pubescent at the top. Corolla reaching ⅝ in. long, rusty-tomentose, split on one side; tube cylindric, slightly curved; lobes 4, spathulate-oblong, subobtuse, thick, concave, ⅙-⅕ in. long. Anthers $\frac{1}{16}$ in. long, narrowly linear. Style 4-sided, exserted; stigma capitate. Fruit ¼ in. long, pyriform, tomentose. Talb. Trees, Bomb. ed. 2, p. 290; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Nov.

Rare. KONKAN: *Stocks*!; Savantvadi jungles, *Kanitkar*!; Mazgaon Hill near Savantvadi, *Kanitkar*!—DISTRIB. India (W. Peninsula), apparently endemic.

5. **Loranthus gibbosus,** *Talbot, Trees, Bomb.* ed. 2 (1902) p. 289. A large shrub with scaly tomentose long pendent branches. Leaves alternate, 1–2½ by ½-1¾ in., ovate or obovate, obtuse, grey- or rusty-tomentose beneath, glabrescent above; nerves 4–5 pairs; petioles ⅕ in. long, stout. Flowers in axillary 1–5-flowered fascicles; bract tomentose. Calyx-teeth very short. Corolla ¾ in. long, curved, inflated and gibbous near the base; tube split on one side; lobes 5, reflexed, oblong; pedicels $\frac{1}{10}$ in. long. Fruit pink, ovoid, ⅓ in. long. Albumen green, with the teeth connate into a conical point, but marked with white lines and slightly swollen round the radicle, presenting the appearance of a grape-seed; embryo with a globose or ovoid smooth radicle, dark-green in color (*Talbot*). *Loranthus tomentosus*, Talb. Trees, Bomb. ed. 1 (1894) p. 171 (*not* of Heyne); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Oct.–Feb. VERN. *Dade.*

KONKAN and N. KANARA Ghâts growing on Phyllanthus emblica and more rarely on Mussænda frondosa, *Talbot*. KANARA: near Gairsoppa Falls, growing on Phyllanthus emblica, *Woodrow*.—DISTRIB. India (W. Peninsula).

The description is that of Mr. Talbot. I have seen no specimens of the plant, which is near *L. tomentosa*, Heyne, a Nilghiri and Ceylon plant.

6. **Loranthus elasticus,** *Desrouss. in Lamk. Encyc. Méthod.* v. 3 (1789) p. 599. Much-branched, glabrous; branches dichotomous, pendulous, terete, swollen at the joints, the young ones green. Leaves opposite, sessile or nearly so, very thickly coriaceous, 1½-4 by ¾-1¾ in., ovate, elliptic, suborbicular or oblong-lanceolate, obtuse, dark-green and smooth above, glaucous beneath, base usually acute, the very young leaves often red; nerves 3–5, obscure. Flowers sessile, fascicled at the nodes; bracts red, broadly ovate, about $\frac{1}{20}$ in. long. Calyx red, ⅛ in. long; tube globose; limb cylindric, entire, about $\frac{1}{20}$ in. long. Corolla 1 in. long, the lower part in bud obtusely 5-angled, the upper part cylindric; tube split, greenish-white with bright green veins; lobes 5, spirally coiled, narrowly linear, longer than the tube. Stamens 5; filaments red; anthers ⅛ in. long, narrow. Style very long, red; stigma fusiform. Berry subglobose or ovoid, sessile, pink, ½ in. long; albumen white, 5-toothed at the apex; embryo club-shaped, the radicle-end covered with minute knobs (*Talbot*). Fl. B. I. v. 5, p. 216; Grah. Cat. p. 86;

Dalz. & Gibs. p. 109; Wight, Icon. t. 343; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Oct.–Dec.

Dalzell without locality in Herb. Kew.! KONKAN: *Graham, Talbot*; Vingorla, *Ritchie*, 338!, *Dalzell & Gibson*; Banda road, *Kanitkar*! DECCAN: Mahableshwar, *Cooke*! KANARA: very common on mango-trees in N. Kanara, *Talbot*; Kála naddi, *Ritchie*, 338!—DISTRIB. India (W. Peninsula), apparently endemic.

7. **Loranthus cuneatus,** *Heyne, in Roth, Nov. Pl. Sp.* (1821) p. 193. Branches long, slender, numerous; bark grey, lenticellate. Leaves subfleshy, alternate (sometimes in fascicles of 2 or 3), 1–1½ by ⅜–⅞ in., obovate, entire, rounded at the apex, glabrous, base cuneate, decurrent into a short petiole; midnerve branching before it reaches the apex of the leaf. Flowers 2–5, in axillary sessile or pedunculate fascicles; pedicels short, slender; bract ⅛ in. long, ovate, subacute, concave, oblique. Calyx ⅙–⅕ in. long, more or less tomentose; tube subcylindric; limb with 5 triangular somewhat irregular lobes about $\frac{1}{20}$ in. long. Corolla reaching about 1¼ in. long, greenish-yellow outside, orange inside; tube straight or slightly curved, 5-ribbed, split down the back, slightly gibbously inflated above the middle; limb with 5 linear-lanceolate spreading or recurved lobes nearly ¼ in. long. Stamens 5, exserted beyond the corolla-tube; filaments dark-red, swollen at their insertion on the corolla; anthers very narrow. Style exceeding the stamens, green; stigma red. Berry red, ¼–⅜ in. long, obconic, truncate, crowned by the calyx-teeth. Albumen green, teeth at top minute, pointed; embryo club-shaped, furrowed; radicle thick, rounded (*Talbot*). Fl. B. I. v. 5, p. 214; Dalz. & Gibs. p. 110; Trim. Fl. Ceyl. v. 3, p. 466; Talb. Trees, Bomb. ed. 2, p. 290; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Apr.–May.

KONKAN: *Law*!, *Dalzell*!; Matheran, *Cooke*! DECCAN: Mahableshwar, very common on the Corkscrew or Rotunda Ghát (the old road to Bombay), *Cooke*! S. M. COUNTRY: Párva Ghát, *Dalzell & Gibson*; Belgaum Hills, *Ritchie*, 1084! KANARA: common near Yellapur on Terminalia paniculata, *Talbot*, 261!; also on Odina Wodier and Vitex altissima, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

8. **Loranthus longiflorus,** *Desrouss. in Lam. Encyc. Méthod.* v. 3 (1789) p. 598. A large bushy usually glabrous branch-parasite; bark grey, smooth; young parts glabrous or nearly so. Leaves thick, coriaceous, usually opposite, 3–7 by ¾–4 in., very variable in shape and venation, ovate, elliptic, or linear-oblong, obtuse; midrib prominent, usually red, the secondary nerves obscure; petioles ⅓–½ in. long, stout. Flowers in short spreading stout axillary unilateral racemes often 2 from an axil; pedicels short; bract $\frac{1}{16}$ in. long, broadly ovate, subacute, concave. Calyx ⅙ in. long, more or less hoary-tomentose: tube cylindric; limb cupular, truncate, or shortly 5-toothed. Corolla 1–2 in. long, split at the back; tube curved, slightly widened upwards, scarlet or orange or less commonly pink or white; lobes 5, linear, ⅜ in. long, reflexed, green or yellowish. Anthers linear, equal in length to the free portion of the filament. Style slender, quadrangular; stigma rather small, subglobose. Berry ⅓–½ in. long, ovoid-oblong, pink, smooth, crowned by the cup-shaped calyx. Albumen white, copious, with 5 linear teeth at the top surrounding the green embryo which resembles a small nail ¼ in. long with a flattened head (the radicle) (*Talbot*). Fl. B. I. v. 5, p. 214; Grah.

Cat. p. 86; Dalz. & Gibs. p. 110; Wight, Icon. t. 302; Trim. Fl. Ceyl. v. 3, p. 468; Talb. Trees, Bomb. ed. 2, p. 290; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368; Prain, Beng. Pl. p. 910; Watt, Dict. Econ. Prod. v. 5, p. 92.—Flowers: Feb.—Mar. VERN. *Bándgul*; *Betungli*.

KONKAN: *Law*!, *Stocks*!; the commonest species in the Konkan, *Dalzell & Gibson*; common on mango-trees in Bombay and throughout the Konkan, *Graham*. DECCAN: *Woodrow*; Poona, *Cooke*! GUJARAT: *Dalzell & Gibson*. KANARA: parasitic on many kinds of trees in N. Kanara, *Talbot*.—DISTRIB. More or less throughout India; Ceylon.

This should strictly be called *L. falcata*, Linn. f. Suppl. (1781) p. 211, a name which is prior to *L. longiflorus*.

VAR. 1. *amplexifolia*, Thwaites, Enum. (1859) p. 134. Leaves large, sessile, 4–8 in. long, broadly elliptic-oblong or suborbicular, almost amplexicaul, base cordate; veins often purple beneath (*Trimen*). Inflorescence often terminal. Fl. B. I. v. 5, p. 215; Trim. Fl. Ceyl. v. 3, p. 468; Watt, Dict. Econ. Prod. l. c. *Loranthus amplexifolius* (sp.), DC. Prodr. v. 4 (1830) p. 305; Grah. Cat. p. 86.—Flowers: Sept.–Oct.

DECCAN: Khandala, *Graham*. S. M. COUNTRY: Rámghát, *Ritchie*, 995! KANARA: N. Kanara, often on Flacourtia montana, *Talbot*.

VAR. 2. *pubescens*, Hook. f. Fl. B. I. v. 5, p. 215. Leaves oblong or elliptic-oblong. Corolla in bud, peduncles, pedicels, and calyx minutely pubescent. Watt, Dict. Econ. Prod. l. c.

KONKAN: *Law*!, *Dalzell*! S. M. COUNTRY: Belgaum, on Flacourtia, Chloroxylon, and Garcinia trees, *Ritchie*, 1083!

VAR. 3. *falcata*, Kurz, For. Fl. v. 2 (1877) p. 321. Leaves narrowly linear, often falcate, 4–6 by $\frac{1}{4}$–$\frac{1}{2}$ in. Flowers $\frac{3}{4}$–1 in. long. Fl. B. I. v. 5, p. 215; Watt, Dict. Econ. Prod. l. c. *Loranthus falcatus*, Linn. f. Suppl. p. 211.

DECCAN: near Poona, *Cooke*! KANARA: N. Kanara on Careya arborea, *Talbot*.

VAR. 4. *coccinea*, Talbot, Trees, Bomb. ed. 1 (1894) p. 172. Branches stout, lenticellate. Leaves broadly ovate, shortly petiolate. Calyx very rugose outside; limb often 5-notched. Corolla-tube 2$\frac{1}{4}$ in. long, bright scarlet; lobes short, light-scarlet or greenish. Filaments scarlet. Fruit ovoid, crowned by the calyx-limb, hard, rugose. The teeth of the albumen are longer and more slender than in *L. longiflorus* proper; embryo white, slender, gradually thickened at the radicle end which is apiculate (*Talbot*).—Flowers: Jan.–Feb.

A stout parasite growing frequently on *Terminalia bellerica* in N. Kanara. The description is taken from that of Mr. Talbot (Trees, Bomb. ed. 2, p. 290). I have not seen any specimens of the variety.

9. **Loranthus trigonus,** *Wight & Arn. Prodr.* (1834) p. 386. A robust glabrous tree-parasite; branchlets often acutely 3-angled. Leaves thickly coriaceous, opposite or whorled in threes, 3–6 by 1$\frac{3}{4}$–3$\frac{3}{4}$ in., broadly elliptic, obtuse, glabrous, base rounded or acute; petioles $\frac{1}{2}$–$\frac{3}{4}$ in. long, stout. Flowers in short axillary or lateral racemes or cymes 1–1$\frac{1}{2}$ in. long; bract small, forming a shallow oblique cup; pedicels $\frac{1}{10}$ in. long. Calyx $\frac{1}{10}$–$\frac{1}{8}$ in. long; limb cupular, truncate. Corolla $\frac{3}{4}$ in. long; tube dilated below the middle, straight; lobes 5, linear, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Berry ellipsoid, $\frac{3}{8}$ in. long, crowned by

the cup-shaped calyx-limb. Embryo with a light-green warted superior radicle and covered by the white 4–5-toothed albumen; cotyledons conferruminate (*Talbot*). Fl. B. I. v. 5, p. 219; Talb. Trees, Bomb. ed. 2, p. 291; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Nov.–Feb.

KONKAN: on the Ghâts of the South Konkan, *Talbot*; Banda, *Woodrow*. S. M. COUNTRY: Belgaum, highest point of N.E. hills, *Ritchie*, 335! KANARA: Kumbarvada, *Talbot*, 1209!; common on the Supa and Siddapur Ghâts growing on Eugenia jambolana, Ficus glomerata, Dalbergia latifolia, Zizyphus xylopyra, and Ficus mysorensis, *Talbot*.—DISTRIB. India (W. Peninsula), apparently endemic.

10. **Loranthus lageniferus,** *Wight, Icon.* (1840) t. 306. Branches stout, terete, pale, with large lenticels. Leaves thinly coriaceous, opposite or alternate, 1¾–5 by 1½–4 in., elliptic or suborbicular, obtuse, glabrous, base rounded or subcordate; petioles ⅛–¼ in. long. Flowers in fascicles on the naked branches; peduncles ⅛–¼ in. long, each surmounted by a campanulate 5-lobed reddish involucre ¾–1¼ in. long, containing about 5 sessile or subsessile flowers; lobes of the involucre short, unequal, deltoid-ovate. Calyx ⅛ in. long, more or less tomentose; limb short with triangular lobes. Corolla 1¼–1¾ in. long, green or green and red, straight, slightly dilated above the middle; limb with an annular enlargement outside just above the base of the lobes; lobes ⅛ in. long, linear-oblong, narrow, subacute, concave. Filaments as long as the anthers; anthers linear-oblong, ⅛ in. long. Stigma capitate, somewhat pear-shaped, pink. Fruit not seen. Differs from all the other Bombay species of *Loranthus* by its campanulate involucre. Fl. B. I. v. 5, p. 218; *Grah. Cat. p. 86; Dalz. & Gibs. p. 110; Talb.* Trees, Bomb. ed. 2, p. 291; *Woodr. in Journ. Bomb. Nat. v. 12 (1899)* p. 368.—Flowers: Apr.–June. VERN. *Bándguli.*

KONKAN: *Law*!; Matheran, *Cooke*!; Bassein Hills (Thana district) on Holarrhena antidysenterica, *Ryan*! DECCAN: Lanoli, *Kanitkar*!, *Woodrow*. S. M. COUNTRY: Castlerock, *Woodrow*. KANARA: deciduous forests of N. Kanara near Dandeli, growing on Adina cordifolia, *Talbot*.—DISTRIB. India (W. Peninsula), apparently endemic.

11. **Loranthus capitellatus,** *Wight & Arn. Prodr.* (1834) p. 382. Branches light-colored, the young branches oval in cross section. Leaves generally opposite, subcoriaceous, 2½–4 by 1–1⅝ in., elliptic-lanceolate, acuminate, glabrous, shining, base acute, decurrent into a short petiole which is sharply keeled at the back. Flowers 3-4 together, sessile or nearly so on very short peduncles in the opposite leaf-axils; bract ⅛ in. long, broadly ovate or suborbicular, apiculate, glabrous; bracteoles 2, similar to the bract. Calyx ⅛ in. long; limb cylindric, nearly truncate. Corolla usually straight, reaching ⅞ in. long, divided to rather below the middle into 6 equal linear or linear-spathulate lobes tipped with purple; tube slightly dilated below the lobes. In bud the lower half of the corolla is white, half the remainder green, and the top of the bud purple; after expansion the green portion becomes red. Stamens 6; anthers multi-locellate. Style slightly exceeding the stamens; stigma subglobose. Berry ellipsoid, ⅜ in. long, capped with the cylindric calyx-limb which gives the fruit a bottle-shaped appearance, black, shining. Fl. B. I. v. 5, p. 221; Dalz. & Gibs. p. 109; Wight, Icon. t. 304; Trim. Fl. Ceyl. v. 3, p. 470; Talb. Trees,

Bomb. ed. 2, p. 291; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368. *Loranthus loniceroides*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368 (*not* of Linn.). *L. ampullaceus*, Wall. Cat. 506, B (*not* of Roxb.); Grah. Cat. p. 86.—Flowers: Feb.–May.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks*!; Matheran, *Cooke*! DECCAN: Mahableshwar, common, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 336!; Chorla Ghát on Lasiosiphon eriocephalus, *Dalzell & Gibson*. KANARA: Supa Ghâts of N. Kanara growing on Artocarpus integrifolia, *Talbot*; Mandele (N. Kanara), *Ritchie*, 1770!—DISTRIB. India (W. Peninsula); Ceylon.

It is this species, and not *Loranthus loniceroides*, Linn., which is common at Mahableshwar and Matheran.

12. **Loranthus loniceroides,** *Linn. Sp. Pl.* ed. 2 (1762) p. 473. Bushy, much-branched, glabrous; stems stout, thickened at the nodes; bark brownish-grey, smooth. Leaves thinly coriaceous, opposite, 2–5 by 1½–2 in., ovate-oblong or oblong-lanceolate, acuminate, shining, base rounded and then suddenly narrowed; petioles ¼–⅓ in. long. Flowers few, in short axillary spikes; peduncles about as long as the petioles, stout, in opposite leaf-axils; bract ⅙ in. long, broadly ovate, acute; bracteoles suborbicular, ⅛–⅙ in. long. Calyx ¼–⅓ in. long; limb cylindric, truncate or very nearly so. Corolla 1–2 in. long, divided ⅓ the way down into 5–6 linear-oblong recurved lobes which are green tipped with dark pink (*Trimen*); tube pink, narrowly infundibuliform, slightly curved. Stamens 6; anthers slender, multi-locellate. Stigma subglobose. Berry green, ellipsoid, ½ in. long, surmounted by the cylindric calyx-limb. Albumen green, firm, grooved and striped longitudinally with 4–5 more or less distinct grey or reddish lines, the teeth cohering in a flattened tip; embryo with 2 separate cotyledons jointed to the radicle which has a swollen and flattened end (*Talbot*). Fl. B. I. v. 5, p. 221; Grah. Cat. p. 86; Dalz. & Gibs. p. 110; Trim. Fl. Ceyl. v. 3, p. 469; Talbot, Trees, Bomb. ed. 2, p. 291.

I have seen no specimens of *L. loniceroides* from the Bombay Presidency. There are none from Bombay in Herb. Kew., the specimens labelled as such by *Law*, *Ritchie*, and *Dalzell* having proved to be *L. capitellatus*, Wight & Arn.

EXCLUDED SPECIES.

LORANTHUS PULVERULENTUS, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. v. 2 (1824) p. 221; Fl. B. I. v. 5, p. 211; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368. The single specimen from Stocks in the Kew Herbarium has been transferred to *L. Scurrula*, Linn. Neither Talbot nor Woodrow has found the plant.

LORANTHUS INVOLUCRATUS, Roxb. Fl. Ind. v. 1 (1832) p. 552. This has been included in Dalzell's 'Bombay Flora' (p. 109) on the authority of Dr. Gibson as occurring at Bhimasankur, but it has not been found by any other collectors and it seems not improbable that Gibson may have mistaken *L. lageniferus* for it. The plant does not apparently occur in the W. Peninsula. Dalzell does not seem to have seen it, as his description in the 'Bombay Flora' is taken from Roxburgh (*l. c.*).

2. VISCUM, Linn.

Shrubs semiparasitic on trees. Leaves opposite, flat, and thick, or reduced to small scales or teeth. Flowers unisexual, fasciculate (rarely solitary), in the axils or on nodes (rarely terminal); bracts usually small; bracteoles 2, free or connate (rarely obsolete). Perianth-lobes in male flowers short and solid, in female flowers adnate to the ovary;

limb 3–4-lobed, the lobes usually deciduous. Stamens 3–4; anthers broad, sessile, adnate to the perianth-lobes, dehiscing introrsely by numerous pores, the cells confluent. Ovary in female flowers inferior, 1-celled; ovule solitary; stigma sessile or subsessile, large, pulvinate. Fruit a succulent berry with soft viscid mesocarp. Seed adnate to the pericarp; albumen copious, fleshy;, embryo terete, enclosed in the albumen, solitary, or sometimes 2 embryos in each seed.—DISTRIB. Temperate and tropical; species about 30.

Branches leafy (sometimes leafless in *Viscum capitellatum*).
- Leaves exceeding 1 in. long.
  - Leaves obliquely ovate or falcate, acute ..... 1. *V. monoicum.*
  - Leaves equally elliptic or elliptic-lanceolate, obtuse ..... 2. *V. orientale.*
- Leaves less than 1 in. long, obovate-spathulate or sub-orbicular, sometimes 0 ..... 3. *V. capitellatum.*

Branches leafless.
- Young branches 4-angled, not swollen nor contracted at the nodes ..... 4. *V. angulatum.*
- Stems and branches flattened, contracted at the nodes ..... 5. *V. articulatum.*

1. **Viscum monoicum,** *Roxb. Fl. Ind.* v. 3 (1832) p. 763. A large shrub; branches terete, slender, slightly thickened at the nodes. Leaves scarcely coriaceous, $1\frac{1}{2}$–5 by $\frac{1}{3}$–$1\frac{3}{4}$ in., obliquely ovate or lanceolate, often falcately curved, acute, base tapering into a short often obscure petiole; basal nerves 3–5, prominent. Flowers monœcious, 3–12 together, in axillary sessile or shortly pedunculate fascicles; bracts truncate, apiculate. Corolla-segments 3 or 4, triangular-oblong. Berry oblong, narrowed at both ends, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Fl. B. I. v. 5, p. 224; Griff. Icon. Pl. As. t. 631; Trim. Fl. Ceyl. v. 3, p. 471; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368; Prain, Beng. Pl. p. 912; Watt, Dict. Econ. Prod. v. 6, part 4, p. 246.—Flowers: Sept.

Rare. S. M. COUNTRY: Londa, *Woodrow.*—DISTRIB. India (Oude, Sikkim, Khasia Hills, W. Peninsula); Ceylon.

2. **Viscum orientale,** *Willd. Sp. Pl.* v. 4 (1805) p. 737. Stems much-branched; branches terete or angular and grooved, sometimes whorled, thickened at the nodes; twigs slender, glabrous. Leaves numerous, $1\frac{1}{4}$–2 by $\frac{1}{2}$–1 in., elliptic or elliptic-lanceolate, obtuse, glabrous, base tapering into a short often obscure petiole; basal nerves 3–5. Flowers in axillary sessile or shortly pedunculate clusters of 3–5, monœcious. Calyx-limb quite absent. Corolla-lobes 3 or 4, triangular, acute, deciduous. Berry ovoid or subglobose, $\frac{1}{4}$ in. long. Albumen green, biconvex, firm; embryo minute, comma-shaped; radicle green, slightly thickened at the top. Fl. B. I. v. 5, p. 224; Blume, Fl. Jav. Loranth. tt. 24, 25; Trim. Fl. Ceyl. v. 3, p. 471; Talb. Trees, Bomb. ed. 2, p. 292; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368; Prain, Beng. Pl. p. 912; Watt, Dict. Econ. Prod. v. 6, part 4, p. 247.—Flowers: Sept.–Jan.

N. Kanara and Konkan Ghâts. KANARA: Nilkund Ghât, *Woodrow*; Nilkund Ghât (N. Kanara) in evergreen forests growing on Terminalia paniculata and also on Loranthus loniceroides, *Talbot*—DISTRIB. India (Bengal, Behar, Chittagong, Birma, W. Peninsula); Ceylon, Malay Islands, China, New Guinea, Australia.

3. **Viscum capitellatum,** *Sm. in Rees, Cyclop.* v. 37 (1819) n. 18. A dwarf shrub forming tufts 6–12 in. in diam.; branches stout, terete or angular; branchlets numerous, opposite, short, horizontal. Leaves

few (sometimes not developed), ¼–1 in. long and often as broad as long, very fleshy, sessile, obovate-spathulate or suborbicular, concave above, sometimes 2-lobed at the apex, base cuneate, obscurely 3-nerved. Flowers very small, sessile, in threes or pairs, terminating short stout divaricate compressed opposite or whorled peduncles. Calyx-limb a fleshy ring. Corolla-lobes 3, triangular, subacute, fleshy, deciduous. Berry about ¼ in. long, ovoid-oblong, slightly rough with small prominences, pale-greenish or nearly white. Albumen green, fleshy, covered with an outer sticky layer; embryo minute with a globose radicle-end (*Talbot*). Fl. B. I. v. 5, p. 225; Trim. Fl. Ceyl. v. 3, p. 471; Talb. Trees, Bomb. ed. 2, p. 292; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Sept.–Dec.

KANARA: Yellapur, *Woodrow*; Sindole (N. Kanara), *Ritchie*, 1769!; on the N. Kanara Ghâts, often parasitic on other Loranthaceæ, also on Terminalia paniculata, *Talbot*.—DISTRIB. India (W. Peninsula); Ceylon.

4. **Viscum angulatum,** *Heyne, ex DC. Prodr.* v. 4 (1830) p. 283. Leafless; main stem terete or nearly so; young branches numerous, 4-angled, jointed, the nodes not swollen nor contracted. Flowers minute, sessile, solitary or whorled at the nodes. Perianth-lobes deciduous. Berry globose. Fl. B. I. v. 5, p. 225; Dalz. & Gibs. p. 110; Talb. Trees, Bomb. ed. 2, p. 292; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368. *Viscum ramosissimum*, Wight, Icon. t. 1017 (*not* of Wall.); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers apparently during most of the year. VERN. *Jalundar*.

KONKAN: Amboli Ghât, *Cooke*! DECCAN: Mahableshwar, *Cooke*! *Woodrow, H. M. Birdwood*. S. M. COUNTRY: Chorla Ghât, growing on Linociera intermedia, *Dalzell & Gibson*. KANARA: common on the Ghâts on many different kinds of trees, *Talbot*. —DISTRIB. India (W. Peninsula); Java, Australia.

5. **Viscum articulatum,** *Burm. Fl. Ind.* (1768) p. 311. A leafless pendulous much dichotomously branched shrub; branches jointed, the internodes 1-2 by $\frac{1}{10}$–⅛ in., linear, flattened, slightly narrowed at each end, readily disarticulating, pale-green (turning yellowish-brown when dry and then longitudinally furrowed). Flowers minute, 3–4-merous, very shortly pedicellate, 1–6 together in fascicles at the nodes, each with a large cup-shaped bract at the base. Perianth-lobes small, triangular, deciduous. Berry ⅛ in. in diam., globose, smooth, greenish-yellow. Fl. B. I. v. 5, p. 226; Trim. Fl. Ceyl. v. 3, p. 472; Talb. Trees, Bomb. ed. 2, p. 293; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368; Prain, Beng. Pl. p. 912; Watt, Dict. Econ. Prod. v. 6, part 4, p. 246. *Viscum attenuatum*, DC. Prod. v. 4, p. 284; Grah. Cat. p. 85.—Flowers: June–Aug.

KONKAN: *Law*!, *Graham*. DECCAN: Lanoli, *Woodrow, Kanitkar*! S. M. COUNTRY on *Diospyros Melanoxylon* in the Dharwar district, *Talbot*.—DISTRIB. India (Himalaya, Assam, Khasia Hills, Birma, Central Provinces, W. Peninsula); Ceylon, Malay Peninsula and Archipelago, Java, Australia.

VAR. *dichotoma*, Kurz, For. Fl. v. 2 (1877) p. 325. Much stouter; internodes thicker and broader, often ½ in. broad. Fl. B. I. v. 5, p. 226. *Viscum dichotomum* (sp.), Don, Prodr. Fl. Nep. p. 142.

KANARA: Ushele (N. Kanara), *Ritchie*, 333!

Excluded Species.

VISCUM RAMOSISSIMUM, Wall. Cat. (1828) 6876. Stems numerous, very much branched, elongate, pendulous, very slender, terete or nearly so, striate. Leaves usually absent (on one only of the 2 sheets in Herb. Kew. there is a single spathulate sessile leaf 1 by ¼ in.). Flowers subsessile, 1–3 at the nodes, very small, with 3-5 imbricate bracts at the base. Berry subglobose, ¼–⅓ in. in diam., apiculate, smooth, pale-green.

I cannot find any specimens of this plant from the Bombay Presidency, most of those purporting to be *V. ramosissimum* being *V. angulatum*, Heyne. It is rare in Ceylon (*Trimen*), Talbot gives the Bababuden hills (which are outside our area) as a habitat, while Wight & Arnott (Prodr. p. 380) give no habitat. There are in all but 2 sheets in Herb. Kew., one from Ceylon and the other without any locality assigned to the plant thereon. Fl. B. I. v. 5, p. 225; Trim. Fl. Ceyl. v. 3, p. 472; Talb. Trees, Bomb. ed. 2, p. 292.

Order CXIII. SANTALACEÆ.

Trees, shrubs, or herbs often semiparasitic on roots. Leaves alternate or opposite, entire, sometimes scale-like or 0; nerves inconspicuous; stipules 0. Flowers hermaphrodite or 1-sexual, regular, usually small, in simple or compound cymes; bracts usually small, sometimes leafy; bracteoles 2, free or connate, subopposite, sometimes 1 or both obsolete. Perianth superior or inferior, simple, green or colored; limb 3–8-toothed, -lobed or -partite; lobes often with a tuft of hairs behind the anthers. Stamens as many as and opposite to the perianth-lobes, attached above (rarely on) the perianth-base; filaments filiform or wide; anthers 2-celled, dehiscence longitudinal, introrse or lateral. Disk epigynous or perigynous. Ovary 1-celled, inferior; ovules 2–3, adnate to or pendulous from a central column; style usually short; stigma entire or 3–6-lobed, Fruit a nut or drupe. Seed globose or ovoid, smooth, rugose or sulcate; testa thin or obsolete; albumen copious, fleshy; embryo small, terete; radicle superior.—Distrib. Temperate and tropical regions; genera 28; species 220.

Trees or shrubs not spinous; anther-cells distinct, parallel.	
Leaves opposite; stamens with interposed processes; a small tree; flowers 2-sexual	1. Santalum.
Leaves alternate; stamens without interposed processes; a shrub; flowers polygamous	2. Osyris.
A spinous tree; anther-cells divergent or confluent; leaves alternate; filaments 2-fid	3. Sclerophyrum.

1. SANTALUM, Linn.

Trees or shrubs. Leaves glabrous, subcoriaceous, opposite (rarely alternate). Flowers hermaphrodite, axillary or in terminal 3-chotomous paniculate cymes; bracts minute. Perianth-tube campanulate or ovoid, adnate to the base of the ovary; limb 4 (rarely 5)-lobed, the lobes valvate and with a tuft of hairs on the face. Stamens 4 or 5, adnate to the base of the perianth-lobes; filaments slender, short; anthers ovate, the cells distinct, parallel. Disk of fleshy spathulate scales, projecting between the stamens. Ovary at first free, ultimately ½-inferior; ovules 2–3, inserted below the summit of a long acuminate free central column; style elongate; stigma 2–3-lobed. Fruit a subglobose drupe, annulate on the top by the deciduous perianth; endocarp rugose. Seed subglobose; albumen copious; embryo linear, terete, straight or nearly so,

in the centre of the albumen; radicle exceeding the cotyledons.—DISTRIB. India, Malaya, Australia, and Pacific Islands; species about 8.

1. **Santalum album,** *Linn. Sp. Pl.* (1753) p. 349. A small evergreen glabrous tree with slender drooping branches; the sap-wood white and odorless, the heart-wood yellowish-brown, strongly scented. Leaves $1\frac{1}{2}$–$2\frac{1}{2}$ by $\frac{5}{8}$–$1\frac{1}{4}$ in., elliptic-lanceolate, subacute, glabrous, entire, thin, base acute; petioles $\frac{3}{8}$–$\frac{1}{2}$ in. long, slender. Flowers brownish-purple, inodorous, in terminal and axillary paniculate cymes shorter than the leaves. Perianth campanulate; limb of 4 valvate triangular segments. Stamens 4, exserted, alternating with 4 rounded obtuse scales. Drupe globose, $\frac{1}{2}$ in. in diam., purple-black; endocarp hard, ribbed. Fl. B. I. v. 5, p. 231; Grah. Cat. p. 177; Dalz. & Gibs. p. 224; Bedd. Flor. Sylvat. t. 256; Talb. Trees, Bomb. ed. 2, p. 293; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368; Prain, Beng. Pl. p. 914; Watt, Dict. Econ. Prod. v. 6, part 2, p. 461.—Flowers: Mar.–Aug. VERN. *Chandan.*

Indigenous throughout the dry districts of the Presidency from Nasik southwards, frequently planted in gardens as far north as Gujarat. KONKAN: *Stocks!, Dalzell!*; in gardens about Bombay, *Graham.* DECCAN: S.W. of Poona, *Dalzell & Gibson*; Dongergaon near Ahmednagar, *Cooke!* S. M. COUNTRY: *Dalzell & Gibson.* KANARA: dry deciduous forests of N. Kanara, *Talbot.*—DISTRIB. India (W. Peninsula), cultivated elsewhere.

The *White Sandalwood Tree.* A valuable essential oil is obtained by distillation from the wood and the roots, which latter yield the largest quantity. The wood is the *Sandalwood* of commerce used for carving, for burning in Parsi temples, and for the cremation of wealthy Hindus. See Watt, Dict. Econ. Prod. l. c.

2. **OSYRIS,** Linn.

Glabrous shrubs; young branches angular. Leaves alternate, entire; stipules 0. Flowers small, axillary, polygamous (male and 2-sexual), the male flowers in clusters, the bisexual often solitary. Perianth-tube solid in the male flowers, in the 2-sexual flowers adnate to the ovary; lobes 3–4, triangular, valvate, with a tuft of hairs on the face. Stamens 3 or 4, inserted at the base of the perianth-lobes; anther-cells distinct. Disk angular. Ovary inferior, sunk in the perianth-tube; ovules 2–4, pendulous from a short stout central placenta; style short; stigma 3–4-lobed. Fruit a globose or ovoid drupe. Seed globose, solitary; embryo in the centre of copious fleshy albumen.—DISTRIB. S. Europe, Africa, India; species 5 or 6.

1. **Osyris arborea,** *Wall. Cat.* (1828) 4035. A large much-branched glabrous shrub; young branches sharply triangular. Leaves subsessile, coriaceous, numerous, glaucous, 1–$1\frac{1}{2}$ by $\frac{1}{2}$–1 in., elliptic-oblong, or oblong-lanceolate, or obovate-oblong, mucronate, base cuneate. Flowers minute, axillary, yellowish-green, the male flowers in long-pedunculate shortly pedicellate 5–10-flowered umbels, the peduncles of the 2-sexual flowers carrying 1–3 flowers and elongating in fruit. Perianth-limb 3-lobed; lobes triangular. Stamens opposite the perianth-lobes. Disk fleshy, 3-lobed, the lobes alternating with the stamens. Stigma 3-lobed. Drupe yellow, $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., subglobose. Fl. B. I. v. 5, p. 232; Trim. Fl. Ceyl. v. 3, p. 474; Talb. Trees, Bomb. ed. 2, p. 294; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368;

Watt, Dict. Econ. Prod. v. 5, p. 655. *Osyris Wightiana*, Wall. Cat. 4036; Grah. Cat. p. 177; Dalz. & Gibs. p. 223; Wight, Icon. t. 1853. —Flowers: Jan.–May. VERN. *Lotal*; *Popli*.

On the Ghâts above 2000 ft., *Dalzell*! DECCAN: hills (widely), *Woodrow*; Khandala, *Graham*, *Cooke*!; Mahableshwar, *Graham*, (abundant along the blue valley road) *Cooke*! S. M. COUNTRY: dry forests of Belgaum districts, *Talbot*; Belgaum, *Ritchie*, 659! KANARA: moist forests of N. Kanara from the sea-coast inland, *Talbot*.—DISTRIB. India (subtropical Himalaya, Birma, Central Provinces, W. Peninsula); Ceylon.

An infusion of the leaves has powerful emetic properties. The leaves have however been used as a substitute for tea in Kumaon, the first infusion, which is nauseating, having been rejected. See Watt, Dict. Econ. Prod. l. c.

IMPERFECTLY KNOWN SPECIES.

OSYRIS DIVARICATA, Pilger, in Bull. Herb. Boiss. sér. 2 (1906) p. 104. A shrub; branches divaricate; branchlets terete, glabrous, with thick transversely fissured bark. Leaves ¼–½ by ⅛–¼ in., elliptic or obovate-elliptic, apiculate or subobtuse, somewhat thick, puberulous on both sides, the nerves inconspicuous except the midnerve. Male flowers 3-merous, in small axillary 3-flowered cymes much shorter than the leaves; peduncles slender, ⅛–¼ in. long; bracts very caducous, lanceolate, very short, falling before the expansion of the flower. Sepals broadly ovate, $\frac{1}{16}$ in. broad, somewhat obtuse. Stamens about ½ as long as the sepals; filaments with a tuft of hairs at the base. Rudimentary ovary 0. Female flowers and fruit unknown.

The above description is that of Pilger from a single specimen in Herb. Boiss. collected by Stocks on the Hala range. There is one imperfect specimen in Herb. Kew. collected by Stocks (no. 811) marked Kusbab? Pass. Of this specimen Sir J. D. Hooker (Fl. B. I. v. 5, p. 232) remarks under *Osyris arborea*: "The Sindh? plant (no doubt from Beluchistan) collected by Stocks appears to be a very different species" (from *Osyris arborea*).

Until the existence of the plant on the Sind portion of the Hala range can be definitely proved, it cannot be included in the Flora of Bombay.

3. SCLEROPYRUM, Arn.

Trees often spiny. Leaves alternate, coriaceous. Flowers in short catkin-like spikes at the leafless nodes, polygamous. Perianth-tube of male flowers solid, of female flowers adnate to the ovary; lobes 5, valvate or subimbricate. Stamens 5, inserted at the base of the lobes, short; anthers dehiscing transversely. Disk annular. Ovary inferior; ovules 3, pendulous from the top of a central column; style short; stigma large, peltate. Drupe pyriform, pedicellate. Seed subglobose; embryo terete.—DISTRIB. India and Ceylon; species 2.

1. **Scleropyrum Wallichianum,** *Arn. in Mag. Zool. & Bot.* v. 2 (1838) p. 550. A small tree armed with sharp conical woody often fascicled spines; bark smooth, greyish-white. Leaves coriaceous, red when young, 3–6 by 1¼–2¼ in., ovate, elliptic or oblong, obtuse or subacute, glabrous, penninerved, base subacute; main nerves 3–5 pairs; petioles ⅛ in. long, stout. Flowers polygamous, yellowish-red. MALE FLOWERS in catkin-like spikes, axillary or above the scars of fallen leaves; bracts filiform, deciduous. Perianth-tube solid; segments 5, slightly imbricate in bud, with tufts of hairs behind the stamens. Stamens 5, inserted at the base of the perianth-lobes; filaments 2-fid; anthers 10. FEMALE FLOWERS in compact cylindric racemes. Perianth-tube adnate to the ovary. Stigma large, peltate. Drupe brown, pyriform,

stalked, 1¼–2 in. long, crowned by the persistent perianth-segments, smooth. Fl. B. I. v. 5, p. 234; Wight, Icon. t. 241; Trim. Fl. Ceyl. v. 3, p. 475; Talb. Trees, Bomb. ed. 2, p. 294. *Pyrularia Wallichiana*, A. DC. in DC. Prodr. v. 14, p. 629; Bedd. Flor. Sylvat. t. 304.—Flowers: Dec.–Mar.

KONKAN: *Dalzell!*; Konkan Ghâts, *Talbot.* KANARA: evergreen forests near Yellapur; common near the Nilkund and Dodmune Ghâts, *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

ORDER CXIV. BALANOPHORACEÆ.

Fleshy leafless often scaly herbs parasitic on roots. Flowers monœcious or diœcious, small or minute, crowded in spadix-like pedunculate heads or cones; peduncles very stout, simple, annual or arising from an amorphous tuberous, or a branching annual or perennial rootstock. MALE FLOWERS: Perianth 0 or of 3–8 valvate lobes. Stamens in the achlamydeous flowers 1–2; in the flowers with a perianth as many as its lobes and opposite to them, or more; filaments 0 or fleshy, free or connate in a column or tube; anthers free or connate, 2–many-celled, opening by pores or valves or bursting irregularly. FEMALE FLOWERS: Perianth 0 or confluent with the ovary; limb 0 or minutely toothed. Ovary 1–3-celled; ovule solitary in each cell, usually pendulous. Fruit minute, 1-seeded. Seed usually adherent to the pericarp; albumen densely granular and oily (rarely floury); embryo minute.—DISTRIB. Genera 14; species about 40, tropical or subtropical.

1. BALANOPHORA, Forst.

Glabrous fleshy herbs with a tuberous rootstock, warted with lenticels abounding in a waxy secretion. Peduncles bursting through the rootstock, which forms an irregularly toothed or lobed ring or short sheath at its base. Flowers minute, intermixed with clavate cellular bodies, monœcious or diœcious. MALE FLOWERS: Perianth of 2–6 valvate lobes. Stamens 2–∞; filaments 0 or connate in a solid column. FEMALE FLOWERS: Perianth 0. Ovary ellipsoid, compressed, 1-celled, narrowed into the style; ovule solitary, pendulous; style long, slender; stigma terminal. Seed globose; albumen oily; embryo subglobose, consisting of 2–3 cells only.—DISTRIB. Eastern Asia, Australia, Polynesia; species about 12.

1. **Balanophora indica,** *Wall. Cat.* (1828) 7247. Rhizome tuberous with rounded lobes or branches, finely warted all over with large scattered stellate pustules, pale brown. Flowering stems numerous, crowded, male and female from the same rhizome, 3–6 in. long, the male rather the longer, closely covered with large ovate-oblong obtuse imbricate glabrous yellow or orange scales. MALE FLOWERS crowded in ovoid-oblong heads 2–2½ in. long, dull-red, drying dark-brown; pedicels rather stout, at first erect, then drooping; bracts much shorter than the pedicels, truncate. Perianth white; segments 4 or 5, linear, subacute, reflexed, ⅛ in. long. FEMALE FLOWERS in nearly globose velvety heads 1¼ in. in diam., purplish, drying dark-brown, densely covered with the

minute flowers and with small clavate bodies. Perianth 0. Ovary stalked, hyaline; style long. Fl. B. I. v. 5, p. 237; Weddell, in Ann. Sc. Nat. sér. 3, v. 14 (1850) t. 9; Hook. f. in Trans. Linn. Soc. v. 22 (1859) p. 46; Mrs. Hart, in Journ. Bomb. Nat. Hist. Soc. v. 1 (1886) p. 75; Trim. Fl. Ceyl. v. 3, p. 476; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368.—Flowers: Oct.-Nov.

DECCAN: Mahableshwar, *Mrs. W. E. Hart*, fairly plentiful in the wood above the Dhobi's waterfall in November, *H. M. Birdwood*; Khandala, on roots of Carissa Carandas, *Woodrow*. S. M. COUNTRY: Chorla Ghát, *Dalzell*!—DISTRIB. India (W. Peninsula); Ceylon.

ORDER CXV. EUPHORBIACEÆ.

Trees, shrubs, or herbs often with milky juice. Leaves alternate or opposite, rarely divided or compound; stipules usually small, caducous or persistent, rarely connate in a bud-protecting sheath; glands sometimes at the apex of the petiole or at the base of the leaf-blade. Flowers usually small or minute, always 1-sexual; inflorescence various, usually compound, sometimes (*Euphorbia*) of single naked 1-staminate florets in a perianth-like involucre surrounding a solitary pistil, more commonly the main inflorescence centripetal, axillary or racemose, the subdivisions cymose, sometimes wholly cymose in terminal dichotomous panicles, or reduced to simple clusters or solitary florets. Perianth often small, sometimes obsolete, often dissimilar in the two sexes, usually simple, calycine with valvate or imbricate segments, sometimes calycine and 2-seriate imbricate, with segments all similar or occasionally dissimilar, rarely double, the inner then of 4–5 small scale-like, or very rarely conspicuous petals. MALE FLOWERS: Torus sometimes forming an intra-staminal disk or with disk-glands or -lobes alternate with the stamens of the outer series. Stamens various, sometimes solitary or fewer than, sometimes as many as the sepals or petals, sometimes indefinite (rarely very numerous); filaments free or connate; anthers 2-celled, often didymous with longitudinal, transverse or porous dehiscence. Rudimentary ovary present or 0. FEMALE FLOWERS: Sepals usually larger and less connate than in the male. Petals sometimes smaller and less often present than in the male. Disk hypogynous or of discrete glands or 0. Ovary superior, sessile or stipitate, usually of 3 (rarely more or 2) carpels more or less united; ovules 1–2 in each carpel, pendulous from the inner angle of the cell, the funicle often thickened; styles as many as the carpels, free or united or entire or divided; stigmatic surface usually on the inner face of the styles or style-arms. Fruit usually a capsule of three 2-valved 1–2-seeded cocci separating from a persistent axis, or a drupe with 1–3 cells or of one or more combined nuts. Seeds laterally attached at or above the middle of the cells, with or without an aril or caruncle at the hilum; albumen fleshy; embryo straight, enclosed in the albumen; cotyledons flat, leafy, and radicle superior; rarely albumen 0 and cotyledons fleshy.—DISTRIB. Chiefly tropical, rare in cold countries; genera 200; species about 3000.

Flowers aggregate-monœcious in heads resembling single flowers consisting of a calyx-like involucre enclosing several flowers without perianths, viz. many males, each consisting of a solitary pedicellate stamen, surrounding a single central female consisting of a single 3-carpellary pistil..... 1. EUPHORBIA.

Flowers dicœcious or separate-monœcious; inflorescence mostly axillary or lateral; perianth of sepals always present, sometimes also petals.
- Stamens of the outer or only series opposite the sepals, or, if stamens all in centre of flower, the cells of the 2–many-carpelled ovary each 2-ovulate; petals when present minute; sepals 1-2-seriate; inflorescence lateral or axillary.
  - Leaves 3-foliolate ..... 2. BISCHOFIA.
  - Leaves simple, entire (sometimes serrulate in *Cyclostemon*).
    - Males in axillary fascicles or solitary, axillary.
      - Corolla of 5 (rarely 6) scale-like petals.
        - Calyx lobes or segments 5, valvate.
          - Ovary 2-celled; fruit a drupe ..... 3. BRIDELIA.
          - Ovary 3-celled; fruit a capsule ..... 4. CLEISTANTHUS.
        - Calyx of 5–6 imbricate sepals.
          - Disk of males broad, entire or 5-lobed; large shrubs or small trees ..... 5. ACTEPHILA.
          - Disk of males of distinct glands; herbs or undershrubs..... 6. ANDRACHNE.
      - Corolla absent in both sexes; sepals imbricate.
        - Styles confluent in a long or short column or cone; disk 0 in either sex; anthers 3-8 adnate to a central column ..... 7. GLOCHIDION.
        - Styles separate or if partly connate the style-arms and stigma free.
          - Styles or style-arms slender.
            - Pistillode in males large; disk present in both sexes; stamens 3–5; filaments free; dicœcious shrubs ..... 8. FLUGGEA.
            - Pistillode absent in males.
              - Disk 0 in either sex.
                - Stamens 3; filaments united in a column.
                  - Anthers sessile on the angles of a 3-gonous column; small monœcious shrubs or undershrubs ..... 9. SAUROPUS.
                  - Anthers adnate to whole length of column; monœcious shrubs or small trees ..... 10. BREYNIA.
              - Disk present in the female and often in male flowers; filaments free or united .... 11. PHYLLANTHUS.
          - Styles much dilated; fruit an indehiscent drupe.
            - Stamens 2–4 central; drupe 1-seeded . 12. PUTRANJIVA.
            - Stamens 4–∞, round an orbicular disk.
              - Ovary usually 1-celled; dicœcious trees or shrubs ..... 13. HEMICYCLIA.
              - Ovary 2–4-celled; dicœcious trees... 14. CYCLOSTEMON.
    - Males in axillary spikes racemes or panicles; stamens free round a rudimentary pistillode; fruit indehiscent; trees or shrubs usually dicœcious.
      - Seeds without an aril.
        - Ovary 1-celled; flowers of both sexes in slender racemes or spikes; stamens 2–5 ..... . 15. ANTIDESMA.
        - Ovary 2-celled; males in catkin-like spikes; females clustered; stamens 1–5 ..... 16. APOROSA.
      - Seeds with an aril; ovary 2–3-celled; flowers in racemes; stamens 4–8 ..... 17. BACCAUREA.

Stamens of the outer or only series alternate with the sepals, or, if stamens all in the centre of flower, the cells of the 2–3 (rarely 4)-carpellate ovary each 1-ovulate; petals if present often exceeding the sepals; inflorescence axillary or terminal.
- Petals present at least in the male flowers.
  - Inflorescence terminal.
    - Flowers in androgynous 2–3-chotomous cymes; leaves usually digitately lobed; stamens erect ..... 18. JATROPHA.
    - Flowers in androgynous spikes or racemes; leaves not digitately lobed; stamens inflexed in bud with anthers reversed ..... 19. CROTON.
    - Male sepals imbricate in bud (open in 22, *Dimorphocalyx*).
      - Male petals united; females with petals; fruit a drupe; a stellately tomentose tree ..... 20. GIVOTIA.
      - Male petals free.
        - Sepals of female flowers accrescent in fruit.
          - Females without petals; male petals shorter than the calyx ..... 21. BLACHIA.
          - Females with petals; male petals longer than the calyx ..... 22. DIMORPHOCALYX.
    - Male sepals valvate in bud.
      - Petals present in both sexes; glabrous shrubs ..... 23. AGROSTISTACHYS.
      - Petals of female narrow or 0; hispid or stellately tomentose herbs ..... 24. CHROZOPHORA.
- Petals 0 in either sex.
  - Male sepals 4–6, imbricate, free ..... 25. BALIOSPERMUM.
  - Male calyx closed in bud, usually membranous, splitting valvately into 3–5 concave sepals, the sepals of females sometimes imbricate.
    - Styles distinct, usually long, entire, 2-fid, multifid or papillosely fimbriate; fruit capsular (rarely drupaceous).
      - Filaments free.
        - Anthers 2-celled, the cells united by their bases only.
          - Styles short, undivided ..... 26. CLAOXYLON.
          - Styles very long, fimbriate or lacerate . 27. ACALYPHA.
        - Anther-cells oblong or globose, laterally attached by a narrow or broad connective.
          - Stamens 4; styles plumose ..... 28. ADENOCHLÆNA.
          - Stamens many; anther-cells 2.
            - Leaves opposite; flowers rather large, dicœcious; anther-cells oblong ..... 29. TREWIA.
            - Leaves alternate or opposite; flowers minute, moncœcious or dicœcious; anther-cells globose ..... 30. MALLOTUS.
        - Stamens many or few; anthers 3-4-locellate, the cells globose.
          - Styles very long with 2–3 filiform arms ..... 31. CLEIDION.
          - Styles entire ..... 32. MACARANGA.
      - Filaments connate in bundles or branched; disk 0; fruit capsular; flowers dicœcious, the males and females in axillary or infra-axillary spikes ..... 33. HOMONOIA.

Styles connate; twining herbs with alternate leaves; flowers in axillary racemes; male calyx 3–5-partite; stamens 1–3; fruit capsular ..... 34. TRAGIA.
Calyx of male open in bud; leaves alternate; styles entire, free or connate at the base.
Trees or shrubs; stamens 3; filaments free.
Calyx 2–3-lobed; fruit fleshy or pulpy ..... 35. SAPIUM.
Calyx deeply 5-partite; fruit crustaceous ..... 36. EXCŒCARIA.
Herbs; stamens 2–4; filaments connate at the base; fruit crustaceous ..... 37. SEBASTIANIA.

1. EUPHORBIA, Linn.

Herbs, shrubs, or small trees of various habit, with milky juice; stems slender and leafy or thick and fleshy and sometimes leafless or nearly so. Leaves opposite or less commonly alternate. Flowers monœcious, combined in an inflorescence of many male florets surrounding a solitary female, arranged in a common 4–5-lobed perianth-like involucre with thick glands at the mouth, each gland often bearing a petaloid spreading white or colored limb. MALE FLOWERS a stalked stamen without floral envelope. FEMALE FLOWERS: Ovary 3-celled on an ultimately exserted stalk in the centre of the involucre; ovule solitary in each cell; styles 3, free or connate. Fruit a capsule of three 2-valved cocci, separating elastically from a persistent axis and dehiscing ventrally or both ventrally and dorsally. Seeds albuminous; cotyledons broad, flat. The flower-heads in the genus have all the appearance of a single 2-sexual flower, especially when the involucre bears petal-like appendages.—DISTRIB. Species about 600, in all climates but the very cold.

Stems not developed above ground; leaves all radical ..... 1. *E. acaulis.*
Stems well developed above ground; leaves not all radical.
Perennial shrubs or small trees; stems and branches thick, fleshy; glands of involucre without a petaloid limb.
Styles 2-fid; leaves few, small, less than 1 in. long, very deciduous ..... 2. *E. antiquorum.*
Styles undivided; leaves many, large, exceeding 4 in. long.
Branches angular, with stipular thorns arising from thick subconfluent tubercles arranged in more or less regular rows..... 3. *E. ligularia.*
Branches cylindric, with stipular thorns arising from low distant spirally arranged tubercles... 4. *E. neriifolia.*
Annual herbs with slender erect ascending or prostrate stems and branches; glands of involucre with or without a petaloid limb.
Leaves exstipulate, alternate below and opposite above, or all alternate except the uppermost floral leaves; glands of involucre 2-horned without a petaloid limb.
Leaves less than 2 in. long ..... 5. *E. dracunculoides.*
Leaves more than 2 in. long ..... 6. *E. Rothiana.*
Leaves all opposite, stipulate, or, if stipules absent, the leaf-attachments connected by a transverse interpetiolar line; glands of involucre not horned, usually with a membranous petaloid limb.
Gland of the involucre with a conspicuous petaloid limb.
Floral leaves distichously imbricating, secund, concealing the involucres.
Leaves exceeding 1 in. long; capsules glabrous.

Seeds tuberculate ..... 7. *E. pycnostegia.*
Seeds smooth..... 8. *E. zornioides.*
Leaves less than 1 in. long; capsules hairy ..... 9. *E. elegans.*
Floral leaves not distichously imbricating.
Cocci winged ..... 10. *E. notoptera.*
Cocci not winged.
Two upper limbs of involucre-glands much larger than the two lower ones. 11. *E. rosea.*
Limbs of involucre-glands subequal.
Involucres in villous heads; a decumbent villous herb ..... 12. *E. coccinea.*
Involucres in many-flowered cymes.
A dwarf glabrous shrub of the seashore; leaves entire; capsules glabrous ..... 13. *E. Atoto.*
Herb 6–18 in. high; leaves serrulate; capsules hairy ..... 14. *E. hypericifolia* var. *parviflora.*
Involucres solitary, axillary.
Erect glabrous herb; leaves obovate or elliptic-oblong, not imbricating..... 15. *E. erythroclada.*
Decumbent herb; leaves linear-oblong, secund, subimbricate ... 16. *E. linearifolia.*
Limb of involucre-gland inconspicuous or 0.
Erect or ascending herb 6–20 in. high, hispid with crisped hairs; leaves ¼–1½ in. long ... 17. *E. pilulifera.*
Prostrate herbs; leaves small, less than ½ in. long.
Stems hispidly hairy; capsules pubescent or hirsute.
Leaves crenulate; capsules pubescent; seeds furrowed ..... 18. *E. thymifolia.*
Leaves entire; capsules hirsute; seeds pitted ..... 19. *E. granulata.*
Stems glabrous; capsules glabrous.
Leaves nearly as broad as long; seeds smooth ..... 20. *E. microphylla.*
Leaves much longer than broad; seeds obscurely transversely rugose ..... 21. *E. Clarkeana.*

1. **Euphorbia acaulis,** *Roxb. Hort. Beng.* (1814) p. 36. Stem reduced to a stout cylindric underground rootstock 6–18 in. long by 1–2½ in. in diam., with only the scarred tip of the buried stem showing above ground. Leaves all radical, 6–12 by 1½–2½ in., subsessile, fleshy, nerveless, obovate or oblanceolate, obtuse or subacute, cuneate at the base, with curled margins, often spotted with red, glabrous. Cymes on long peduncles from the crown of the rootstock, appearing after the leaves have fallen, 3–many-flowered, dichotomous, of variable length; bracts at the forks ovate-lanceolate, scarious. Involucres about ¼ in. in diam., greenish. Capsules ⅓ in. in diam.; pedicels ½ in. long or less; cocci compressed; styles combined to the middle. Seeds broadly ovoid, subacute, smooth (*Hooker*).

The specific name *acaulis* given to the plant by Roxburgh is 11 years prior to the name *fusiformis*, Buch.-Ham. Grah. Cat. p. 179; Dalz. & Gibs. p. 226. *Euphorbia fusiformis*, Buch.-Ham. ex Don, Fl. Nep. (1825) p. 62; Hook. f. Fl. B. I. v. 5, p. 257; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 921.—Flowers: Apr.–May.

KONKAN: *Dalzell!*; Konkan hills, *Graham*; Savantvadi, *Dalzell & Gibson.* DECCAN: Poona hills, *Woodrow*; Mahableshwar, *Graham, Dalzell & Gibson, H. M. Birdwood.*—DISTRIB. India (Tropical Himalaya, Bengal, W. Peninsula).

2. **Euphorbia antiquorum,** *Linn. Sp. Pl.* (1753) p. 450. A large shrub or small tree 15–30 ft. high; trunk stout, sometimes nearly 1 ft. in diam., cylindric or fluted; bark thick, rough, brown; branches numerous, curving upwards, stout, fleshy, green, jointed, with 3–5 wide thick sinuate wings narrowed at either end in each joint and coarsely repand-crenate. Leaves small, ¼–½ in. long, subsessile, obovate-oblong, rounded or subtruncate, cuneate, fleshy, glabrous, soon deciduous, which gives the plant a leafless appearance; stipular spines short, sharp, divaricate, persistent. Involucres 3-nate, forming small pedunculate cymes, the central flower sessile, female, the 2 lateral on long stout pedicels; bracteoles numerous, laciniate; glands 5, large, broader than long. Stamens numerous. Capsules nearly ½ in. in diam.; cocci compressed, glabrous; styles 2-fid. Fl. B. I. v. 5, p. 255; Grah. Cat. p. 179; Dalz. & Gibs. p. 226; Wight, Icon. t. 897; Bedd. For. Man. in Flor. Sylvat. p. ccxvi & Anal. Gen. t. 22, fig. 4; Trim. Fl. Ceyl. v. 4, p. 4; Talb. Trees, Bomb. ed. 2, p. 297; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 921; Watt, Dict. Econ. Prod. v. 3, p. 294.—Flowers in the rainy season.

Not common. DECCAN: Bijapur districts, *Talbot.* S. M. COUNTRY: Belgaum districts, *Talbot.*—DISTRIB. Throughout the hotter parts of India and Ceylon.

3. **Euphorbia ligularia,** *Roxb. Hort. Beng.* (1814) p. 36. An erect fleshy glabrous shrub or small tree seldom reaching 20 ft. high; branches scattered, ascending, the young ones 5-sided, angled, with short stipular sharp thorns arising from thick tubercles arranged in 5 irregular rows. Leaves 6–12 by 2–3 in., alternate, near the tops of the branches, obovate-oblong or subspathulately obovate, acute, deciduous, base narrowed into a very short petiole; stipular thorns solitary or in pairs, ⅓–½ in. long. Involucres yellowish, hemispheric, in small stout dichotomous shortly pedunculate cymes, the lateral ones of the cymes with short thick pedicels, the central sessile and usually male; lobes large, erect, roundish, fimbriate; glands transversely oblong; bracts numerous, fimbriate. Styles connate high up, undivided; stigmas capitate. Capsules deeply 3-lobed, about ½ in. broad; cocci compressed, glabrous. Roxb. Fl. Ind. v. 2 (1832) p. 465; Buch.-Ham. in Trans. Linn. Soc. v. 14 (1825) p. 285 (exclud. syn.). *Euphorbia neriifolia,* Dalz. & Gibs. Bo. Fl. (1861) p. 226 (*not* of Linn.); Hook. f. Fl. B. I. v. 5, p. 255; Talb. Trees, Bomb. ed. 2, p. 297; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 922; Watt, Dict. Econ. Prod. v. 3, p. 297. *Ligularia lactea,* Rumph. Herb. Amboin. v. 4 (1750) p. 91, t. 40; Grah. Cat. p. 179 and p. 251.—Flowers: Feb.–Mar., the new leaves appearing after the flowers. VERN. *Thor*; *Sij.*

Throughout the Presidency; often planted as a fence.—DISTRIB. India (W. Peninsula); cultivated elsewhere and in Ceylon; Beluchistan, Malay Islands.

Some confusion exists regarding this plant. There are two distinct plants, *Euphorbia neriifolia,* Linn., with *round stems* (*E. Nivula,* Buch.-Ham.), and *E. ligularia,* Roxb., with *angular stems.* Linnæus (Hort. Cliff. [1737] p. 196, *n.* 3) calls the stem of *E. neriifolia* (thus named in Sp. Pl. [1753] p. 451) "teretiusculus quinquefariam tuberculis prominulis angulatus." Roxburgh (*Icones Roxburghianæ* in Herb. Kew.) figures the stem of *E. neriifolia* in t. 1065 and t. 1971, contrasting it with the stem

of *E. ligularia* in t. 1972. Rumphius (Herb. Amboin. v. 4 [1750] p. 91, t. 40) has, under the name *Ligularia lactea*, a drawing of the entire plant clearly showing its peculiar character. Roxburgh (Fl. Ind. l. c.) cautions botanists against the error of assuming the identity of *E. neriifolia*, Linn., with *E. ligularia*, Roxb., and moreover states that he has had both plants growing for 14 years in the botanic garden at Calcutta. *E. Nivulia*, Buch.-Ham., is clearly *E. neriifolia*, Linn., with round stems. There is an excellent drawing of this plant, under Hamilton's name, in Herb. Kew., presented by Mr. Duthie, which exactly agrees with Roxburgh's drawing of *E. neriifolia*.

4. **Euphorbia neriifolia,** *Linn. Sp. Pl.* (1753) p. 451. A large glabrous fleshy erect shrub or small tree reaching 20 ft. or more high; branches round, somewhat verticillate, with pairs of sharp stipular spines arising from low conical truncate distant spirally arranged tubercles. Leaves towards the ends of the branches, fleshy, alternate, 4–8 by $1\frac{1}{4}$–$2\frac{1}{2}$ in., obovate or obovate-oblong, rounded at the apex, smooth, glabrous, tapering towards the base, sessile or nearly so, deciduous; midrib conspicuous beneath, the other nerves obscure. Involucres hemispheric, 3-nate, forming small shortly pedunculate solitary or twin cymes from above the leaf-scars on the tubercles, the central flower of each cyme male, sessile, appearing first, the 2 lateral flowers 2-sexual, pedicellate; lobes of involucres large, erect, fimbriate; glands transversely oblong; bracteoles numerous, fimbriate. Stamens 40 in 5 bundles (*Dalzell & Gibson*). Capsules $\frac{1}{4}$ in. broad; styles connate to the middle, undivided. Seeds smooth. *Euphorbia Nivulia*, Buch.-Ham. in Trans. Linn. Soc. v. 14 (1825) p. 286; Wight, Icon. t. 1862; Dalz. & Gibs. p. 225; Hook. f. Fl. B. I. v. 5, p. 255; Bedd. For. Man. in Flor. Sylvat. p. ccxvi; Talb. Trees, Bomb. ed. 2, p. 297; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 922; Watt, Dict. Econ. Prod. v. 3, p. 298.—Flowers: March. VERN. *Nurang.*

GUJARAT: common, *Dalzell & Gibson*; dry rocky hills, *Talbot.* SIND: common, *Dalzell & Gibson, Talbot.*—DISTRIB. India (N.W. Himalaya, Pegu, Birma, W. Peninsula), often planted for hedges.

5. **Euphorbia dracunculoides,** *Lamk. Encyc. Méthod.* v. 2 (1786) p. 428. An annual dichotomously much-branched herb 1–$1\frac{1}{2}$ ft. high; stems many from the root, erect, leafy. Leaves of the stem sessile, $1\frac{1}{4}$–$2\frac{3}{4}$ by $\frac{1}{8}$–$\frac{1}{4}$ in., linear or linear-lanceolate, subacute, base acute (rarely rounded); floral leaves broader at the base and shorter. Involucres broadly campanulate, subsessile, solitary, $\frac{1}{10}$ in. across at the mouth, glabrous outside, pubescent inside; lobes short, ovate, ciliolate; glands semilunate, horned; filaments pubescent. Capsules $\frac{1}{8}$–$\frac{1}{6}$ in. in diam.; styles $\frac{1}{25}$ in. long, free to the base, shortly 2-fid at the apex. Seeds $\frac{1}{8}$ in. long, ellipsoid, rounded at the base, grooved down one side, with an arillode at the oblique depressed apex; testa whitish, leprous, rugose or tuberculate. Fl. B. I. v. 5, p. 262; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 922; Watt, Dict. Econ. Prod. v. 3, p. 295.—Flowers: Aug.

DECCAN: Sholapur, *Woodrow*!; Máwal táluka (Poona districts), *Kanitkar*! S. M. COUNTRY: Badami, *Cooke*! SIND: *Bhola Puran*!—DISTRIB. Throughout India in the plains and low hills; Arabia, Tropical Africa.

6. **Euphorbia Rothiana,** *Spreng. Syst.* v. 3 (1826) p. 796. Annual or perennial, erect, glaucous, 1–2 ft. high, abounding with milky juice; stem glabrous, cylindric, often tinged with red, densely

leafy; branches slender, some whorled round the stem from the upper leaf-axils, others in a whorled umbellate crown from the top of the stem, all again dichotomously branched. Leaves of the stem alternate, sessile, 2½–4 by ¼–⅝ in., linear-oblong, lanceolate, acute, mucronulate, entire, glabrous, base tapering; leaves beneath the whorled crown of branches 4, sessile, radiating, broader than the stem-leaves; floral leaves (bracts) beneath the dichotomous forks, opposite, broadly ovate or orbicular, acute, mucronate, rounded at the base. Involucres solitary, axillary in the upper axils, and terminal, $\frac{1}{10}$ in. in diam. at the mouth, campanulate, glabrous; pedicels short; lobes short, subquadrate, ciliate; gland semi-lunate, horned, reaching ⅙ in. long, including the 2 decurved acute horns. Capsules nearly ¼ in. in diam., glabrous; styles $\frac{1}{10}$ in. long, free almost to the base, 2-fid at the apex. Seeds ⅛–⅙ in. long, oblong, semicylindric, rounded at the base, grooved down one side, with a fleshy rugulose arillode at the oblique depressed apex, bluish-grey when ripe, smooth. Fl. B. I. v. 5, p. 263; Dalz. & Gibs. p. 226; Wight, Icon. t. 1864; Trim. Fl. Ceyl. v. 4, p. 8; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369. *Euphorbia glauca*, Roxb. Fl. Ind. v. 4 (1832) p. 473. *E. segetalis*, Grah. Cat. p. 179 (*not* of Willd.).—Flowers: Sept.–Nov. VERN. *Dudhi.*

KONKAN: *Stocks!*, *Law!*; Dasgaon, *Dalzell & Gibson.* DECCAN: Mahableshwar, common, *Cooke!*, *H.M. Birdwood*; near Satara, *Kanitkar!*; Ambadkhind near Bhor, *Kanitkar!* S. M. COUNTRY: Belgaum, *Ritchie*, 1251!—DISTRIB. *India* (hills of Central India, W. Peninsula); Ceylon.

7. **Euphorbia pycnostegia,** *Boiss. Cent. Euphorb.* (1860) p. 9. Annual, slender, erect, glabrous, dichotomously branched, 1–2 ft. high; stems often tinged with purple, terete, smooth, with swollen rather distant nodes. Leaves of the stem thin, 1–1½ by ½–⅝ in., opposite, sessile, oblong, obtuse or subacute, glabrous or nearly so, entire or finely serrulate; floral leaves reaching ⅝ in. long, distichously imbricating, broadly ovate-cordate or suborbicular, often tinged with purple, reticulately veined, entire or serrulate, obtuse, often shortly apiculate; stipules minute, fimbriate. Involucres stalked, ¼ in. or more long (including the stalk), turbinate, glabrous outside, hairy inside; lobes fimbriate; gland transversely oblong; limb white, obliquely obovate or suborbicular, rounded at the apex. Capsules glabrous; cocci obtusely keeled; styles short, divaricate, each deeply 2-lobed. Seeds $\frac{1}{12}$ in. long, oblong, obtusely 4-angled, tuberculate. Fl. B. I. v. 5, p. 246; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369.

KONKAN: *Stocks!*, *Law!*; Salsette, *Law!* DECCAN: Bhore, *Kanitkar!*; Khandala, *Cooke!*; Mahableshwar, *H. M. Birdwood.*—DISTRIB. India (W. Peninsula).

8. **Euphorbia zornioides,** *Boiss. in DC. Prodr.* v. 15, part 2 (1862) p. 19. Glabrous; stem erect, 1–2 ft. high, alternately and dichotomously much-branched, sometimes reaching ⅙ in. in diam., and woody at the base; stem and branches dark reddish-brown, smooth, polished, terete, with long internodes. Leaves very shortly petiolate, ¾–1¾ by ¼–⅜ in., linear-oblong, obtuse, apiculate, finely serrulate, oblique, unequal-sided and subcordate at the base; stipules triangular, fimbriate; floral leaves finely reticulately veined, ⅕–⅞ in. long, becoming smaller upwards, oblique at the base, serrulate, the upper distichously imbricating, often with pink margins, very shortly petiolate. Involucres subsolitary,

glabrous outside, $\frac{1}{4}$ in. long (including a stalk $\frac{1}{6}$ in. long); lobes fimbriate; gland transversely oblong, about $\frac{1}{20}$ in. long; limb of gland white or rosy, the lobes $\frac{1}{30}$ by $\frac{1}{16}$ in., broadly obovate, subtruncate at the apex. Capsules subglobose; cocci obtusely angled, glabrous; styles short, each 2-lobed. Seeds $\frac{1}{16}$–$\frac{1}{12}$ in. long, 4-angled, bluntly pointed, smooth, not rugose nor tuberculate nor grooved. Fl. B. I. v. 5, p. 246; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 922.

KONKAN: *Stocks*!, *Law*! DECCAN: Máwal (Poona districts), *Woodrow*; one mile south of Karkala Station (G. I. P. R.), *Kanitkar*!—DISTRIB. India (W. Peninsula).

9. **Euphorbia elegans,** *Spreng. Syst.* v. 3 (1826) p. 794. Stem 1–2 ft., dichotomously branched; branches numerous, slender, clothed with long close or scattered weak soft hairs. Leaves opposite, distant, subsessile, $\frac{1}{4}$–$\frac{3}{4}$ by $\frac{1}{4}$–$\frac{1}{2}$ in., broadly elliptic-oblong, obtuse, serrulate; floral leaves subsessile, reaching $\frac{5}{8}$ by $\frac{1}{2}$ in., broadly elliptic or obovate, obtuse, softly hairy inside, much imbricating, forming short spikes at the ends of the branches. Involucres hairy outside and inside, $\frac{1}{4}$ in. long (including stalk), turbinate; limb of gland $\frac{1}{8}$ in. and more long, the lobes not oblique, rosy, obovate-cuneate, sinuate at the apex. Capsules hairy outside; cocci subglobose; styles long, 2-fid. Seeds $\frac{1}{16}$–$\frac{1}{12}$ in. long, 4-angled, bluntly pointed, transversely parallel-grooved, glabrous. Fl. B. I. v. 5, p. 246; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369. *Euphorbia strobilifera*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 229; Dalz. & Gibs. p. 226. *E. rupestris*, Law, ex Grah. Cat. Pl. Bomb. p. 251 (*not* of Friwald. nor C. A. Mey.).—Flowers: Aug.–Sept.

KONKAN: on rocks in the Wari country, *Dalzell & Gibson*. DECCAN: Alimati Railway Station (Bijapur districts), *Kanitkar*! S. M. COUNTRY: Badami, *Cooke*!—DISTRIB. India (W. Peninsula).

10. **Euphorbia notoptera,** *Boiss. in DC. Prodr.* v. 15, part 2 (1862) p. 26. An erect or ascending glabrous herb 1–2 ft. high; stems dichotomously branched, terete, with long internodes. Leaves in distant opposite pairs, $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{8}$–$\frac{1}{2}$ in., shortly petiolate, often deflexed, linear-oblong, obtuse, very shortly mucronulate, remotely serrulate and with subrevolute margins, glabrous, base subcordate with very unequal lobes; nerves obscure; stipules very short and broad. Involucres solitary or 2–3 together, terminal, $\frac{1}{5}$ in. long (including the stalk), campanulate, with pectinate lobes, supported at the base by linear acute floral leaves $\frac{3}{8}$–$\frac{1}{2}$ in. long; gland transversely oblong; limb of gland with lobes $\frac{1}{12}$ in. long by $\frac{1}{10}$–$\frac{1}{8}$ in. broad, rounded or subtruncate at the apex, white. Capsules depressed-globose, rough, $\frac{1}{10}$ in. in diam.; cocci with 2 distant narrow wings. Seeds $\frac{1}{12}$ in. long, 4-angled, bluntly pointed, tuberculately rugulose. The winged cocci distinguish this from all other species. Fl. B. I. v. 5, p. 247; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369. —Flowers: Oct.–Dec.

In cultivated fields, Dalzell without locality in Herb. Kew. KONKAN: *Stocks*!, *Law*!, *Hooker*!; Vingorla, *Kanitkar*!, *Woodrow*. KANARA: *Law*!; near Kumpta, *Talbot*, 134!—DISTRIB. India (W. Peninsula).

11. **Euphorbia rosea,** *Retz. Obs. Bot.* fasc. 4 (1786) p. 26. A perennial glabrous or sparsely hairy herb with a long woody tap-root; stems numerous, 4–8 in. long, brittle, prostrate, spreading, slender,

flexuous, glabrous. Leaves numerous, opposite, $\frac{1}{4}$–$\frac{5}{8}$ by $\frac{1}{8}$–$\frac{1}{4}$ in., coriaceous, obliquely obovate or linear-spathulate, rounded at the apex, crenulate, serrulate or dentate, base rounded, very unequal-sided; petioles short; stipules interpetiolar, triangular. Involucres solitary or few, in small leafy axillary and terminal nearly sessile cymes $\frac{1}{5}$ in. long to the extremity of largest limb, subcampanulate; stalk $\frac{1}{20}$ in. long; lobes triangular, ciliate; gland small, about $\frac{1}{30}$ in. long, transversely oblong; limbs of the glands rosy, very conspicuous, those of the 2 upper glands long, $\frac{1}{8}$ by $\frac{1}{16}$ in., obliquely oblong, crenulate at the apex, those of the 2 lower glands much smaller, $\frac{1}{30}$ in. long, oblong or suborbicular, crenulate at the tip. Capsules $\frac{1}{12}$ in. long, glabrous; styles $\frac{1}{16}$ in. long, connate about $\frac{1}{2}$-way up from the base, then divaricate and shortly 2-fid at the apex; cocci slightly rough, bluntly keeled. Seeds $\frac{1}{16}$ in. long, transversely rugose. Fl. B. I. v. 5, p. 251; Trim. Fl. Ceyl. v. 4, p. 6; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369.—Flowers: Aug.

S. M. Country: Badami, *Cooke*!, *Bhiva*!, *Woodrow*!—Distrib. India (W. Peninsula); Ceylon, Afghanistan.

12. **Euphorbia coccinea,** *Roth, Nov. Pl. Sp.* (1821) p. 228. Whole plant villous with white hairs; root woody; stems filiform, purple, angularly flexuous, brittle, 4–8 in. long, decumbent or prostrate, softly hispid with long weak hairs. Leaves subsessile, in scattered opposite pairs $\frac{1}{6}$–$\frac{3}{8}$ by $\frac{1}{10}$–$\frac{1}{4}$ in., rather coriaceous, entire, broadly elliptic or obovate-oblong, obtuse, oblique, hairy or glabrate above, densely white-pilose beneath, base broadly auricled on one side; stipules linear-lanceolate, villous. Involucres in the axils of crowded small orbicular terminal leaves, campanulate, subsessile, $\frac{1}{10}$ in. long, forming small villous heads of 2–4 flowers (rarely reduced to a single flower); the tube hairy; the lobes lanceolate, ciliate; limb of gland $\frac{1}{20}$ by $\frac{1}{12}$ in., rosy, broadly obovate, denticulate at the apex, glabrous. Capsules $\frac{1}{10}$ in. long, white-woolly, truncate at the base; cocci compressed, keeled; styles slender, $\frac{1}{30}$ in. long, 2-fid. Fl. B. I. v. 5, p. 248; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369.—Flowers: July–Dec.

Rare. Konkan: *Law*!, *Stocks*! Deccan: Diksal near Railway Station, *Woodrow*; Rajwade, *Woodrow*.—Distrib. India (W. Peninsula).

13. **Euphorbia Atoto,** *Forst. Prodr.* (1786) n. 207. A dwarf glabrous shrub with a long stout root; stem stout, much-branched, swollen at the nodes, erect or decumbent. Leaves opposite, subsessile, $\frac{3}{4}$-1 by $\frac{3}{8}$–$\frac{1}{2}$ in., elliptic or elliptic-oblong, obtuse, entire, base rounded, slightly unequal-sided; stipules small, fimbriate. Involucres axillary or in small leafy terminal cymes, pedicellate, turbinate, glabrous; lobes triangular; limb of glands small. Capsules glabrous; styles short, 2-fid. Seeds smooth. Fl. B. I. v. 5, p. 248; Trim. Fl. Ceyl. v. 4, p. 6; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369.

Doubtfully indigenous in the Bombay Presidency. Woodrow in his list (*l. c.*) gives the habitat of the plant as N. Kanara, but his specimens were obtained from Kandapur, which is in S. Kanara and outside the Presidency limits.—Distrib. S. India; Ceylon, Malay Archipelago, China, Australia.

14. **Euphorbia hypericifolia,** *Linn. Sp. Pl.* (1753) p. 454. Var. **parviflora,** *Hook. f. Fl. B. I.* v. 5 (1887) p. 250. Annual,

6–18 in. high, erect or spreading, glabrous or sparsely pubescent. Leaves opposite, ½–1 by ¼–½ in., elliptic-oblong, obtuse, serrulate, base rounded, usually unequal-sided; nerves prominent beneath, slender; stipules minute, fimbriate, soon falling. Involucres in axillary and terminal usually pedunculate and many-flowered cymes, minute, turbinate, glabrous, with many subulate bracts at the base of the pedicel; lobes lanceolate, ciliate; limb of gland usually white, orbicular, rounded at the apex. Capsules subglobose, hairy; styles short, 2-fid. Seeds $\frac{1}{16}$ in. long, smooth. Trim. Fl. Ceyl. v. 4, p. 7; Prain, Beng. Pl. p. 923; Watt, Dict. Econ. Prod. v. 3, p. 296. *Euphorbia hypericifolia*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369. *E. parviflora* (sp.), Linn. Syst. ed. 10 (1759) p. 1047; Grah. Cat. p. 179; Dalz. & Gibs. p. 227. —Flowers: Aug.–Nov.

KONKAN: *Stocks*!, *Law*! DECCAN: Bowdhán near Poona, *Cooke*!; banks of the Mula River near Poona, *Kanitkar*!; Purandhar, *Dr. Barnes*! GUJARAT: Surat, *Kanitkar*!; Godra, *Cooke*! SIND: Karachi, *Cooke*!—DISTRIB. Common throughout the hotter parts of India; Ceylon, Tropics generally except Australia and the Pacific Islands.

15. **Euphorbia erythroclada,** *Boiss. in DC. Prodr.* v. 15, part 2 (1862) p. 25. An erect glabrous herb 1–2 ft. high, alternately and dichotomously branched; stem and branches terete, polished, reddish-brown, with long internodes. Leaves membranous, ½–⅞ by ¼–⅓ in., in distant opposite pairs, obliquely oblong or obovate or elliptic-oblong, very obtuse, serrulate, base very unequal, rounded; petioles very short; stipules scarcely discernible. Involucres solitary, axillary, turbinate, red; lobes very short, triangular, ciliate; glands transversely ovate with a narrow rosy limb. Capsules depressed, ⅛ in. in diam.; cocci acutely keeled. Seeds 4-angled with 2–3 obsolete transverse ridges. Fl. B. I. v. 5, p. 247.

I have only seen the 2 imperfect sheets of this plant in Herb. Kew. identified and mentioned by Sir J. D. Hooker (Fl. B. I. l. c.). There is absolutely no evidence as to the locality whence these specimens were procured, the "Hab. Malabar, Konkan, &c." being merely on the printed label of Herb. Hook. f. & Thomson.

16. **Euphorbia linearifolia,** *Roth, Nov. Pl. Sp.* (1821) p. 224. Glabrous; stems many from a stout root, decumbent, about 1 ft. long, dark-purple, swollen at the nodes. Leaves ⅜–¾ by $\frac{1}{10}$–⅛ in., opposite, secund, subimbricate, thickly coriaceous, linear-oblong, apiculate, pale beneath (the lowest leaves shorter, ovate-oblong), base unequal-sided, rounded. Involucres solitary in the uppermost axils, ⅛ in. long; pedicel $\frac{1}{16}$ in. long; limb of gland $\frac{1}{10}$ in. long, obovate, cuneate, rounded and crenulate at the apex, white. Styles nearly $\frac{1}{10}$ in. long. Capsules not seen. Fl. B. I. v. 5, p. 249; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369.

KANARA: Diggi (N. Kanara), *Talbot*, 1649!

The plant is but little known. There is but one specimen in Herb. Kew. marked as above.

17. **Euphorbia pilulifera,** *Linn. Sp. Pl.* (1753) p. 454. Annual, 6–20 in. high, erect or ascending, hispid with long often yellowish crisped hairs; stems usually terete; branches often 4-angled. Leaves opposite, ½–1½ by ¼–⅝ in., obliquely oblong-lanceolate or obovate-lanceolate, acute or subacute, serrulate or dentate, dark green above, pale

beneath, base usually unequal-sided, acute or rounded; main nerves few, distinct; petioles distinct, $\frac{1}{16}$–$\frac{1}{8}$ in. long; stipules pectinate, soon falling. Involucres numerous, less than $\frac{1}{20}$ in. long, on a stalk of about the same length, crowded in small axillary shortly pedunculate globose cymes; gland minute, globose, either without a limb or with a very small orbicular white entire one. Capsules $\frac{1}{20}$ in. in diam., appressedly hairy. Seeds $\frac{1}{30}$ in. long, ovoid-trigonous, slightly transversely rugose, light reddish-brown. Fl. B. I. v. 5, p. 250; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 923; Watt, Dict. Econ. Prod. v. 3, p. 298. *Euphorbia hirta*, Linn. Sp. Pl. (1753) p. 454; Grah. Cat. p. 179; Dalz. & Gibs. p. 227; Trim. Fl. Ceyl. v. 4, p. 7.—Flowers more or less throughout the year.

The specific name *hirta* occurs on the same page (Linn. Sp. Pl. p. 454) as the name *pilulifera*, to which it is really prior, as it precedes the latter on the page.

Common everywhere throughout the Presidency.—Distrib. Throughout the hotter parts of India, Ceylon, and most tropical and subtropical countries.

18. **Euphorbia thymifolia,** *Linn. Sp. Pl.* (1753) p. 454. A small annual herb, more or less hispidly pubescent; stems prostrate, divaricately branched, slender, cylindric, more or less hairy. Leaves opposite, very small, numerous, $\frac{1}{8}$–$\frac{1}{4}$ by $\frac{1}{10}$–$\frac{1}{6}$ in., obliquely oblong or elliptic-oblong, rounded at the apex, crenulate, glabrous above, glaucous and usually slightly pubescent beneath, base rounded, very unequal-sided; petioles very short; stipules fimbriate. Involucres axillary, solitary or 2–3 in an axil, campanulate, $\frac{1}{30}$ in. long; *stalk* very short; gland minute or 0; limb 0. Capsules $\frac{1}{16}$ in. long, obtusely keeled, pubescent; styles short, 2-fid. Seeds $\frac{1}{20}$ in. long, quadrangular, bluntly pointed, with 5 or 6 transverse furrows. Fl. B. I. v. 5, p. 252; Dalz. & Gibs. p. 227; Trim. Fl. Ceyl. v. 4, p. 8; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 923; Watt, Dict. Econ. Prod. v. 3, p. 300. *Euphorbia prostrata*, Grah. Cat. p. 179 (*not* of Ait.).—Flowers: more or less throughout the year. Vern. *Dhákti-dudhi*; *Lahán-nayati*.

Deccan: widely, *Woodrow*; Poona, *Woodrow*! Sind: *Cooke*!; Karachi, *Bhola Puran*!—Distrib. Throughout India in the plains and lower hills; Ceylon and all hot countries except Australia.

19. **Euphorbia granulata,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 94. A small hispidly-villous plant with a perennial root; stems many from the root, prostrate, hispid, leafy, 3–6 in. long, very brittle. Leaves opposite, coriaceous, $\frac{1}{10}$–$\frac{1}{5}$ by $\frac{1}{20}$–$\frac{1}{8}$ in., obliquely oblong or obovate-oblong, rounded or retuse at the tip, quite entire, villous on both surfaces, base narrow or rounded or subcordate; petioles short; stipules minute, ciliolate. Involucres minute, axillary and on short leafy branchlets, subsessile, turbinate, $\frac{1}{20}$ in. long; gland usually without a limb. Capsules $\frac{1}{15}$ in. in diam.; cocci hirsute, rounded at the back, not keeled; styles very short, 2-fid. Seeds quadrangular, bluntly pointed, $\frac{1}{20}$ in. long, faintly pitted; testa very mucous when wetted. Fl. B. I. v. 5, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 923; Watt, Dict. Econ. Prod. v. 3, p. 295.

Sind: Karachi to Magar Pir, *Wykeham-Perry*! There is but one very dilapidated specimen in Herb. Kew. from Sind.—Distrib. India (Panjáb, Malwa, Chota Nagpur, W. Peninsula); Afghanistan, Arabia, Egypt, Canary Isles.

20. **Euphorbia microphylla,** *Heyne, in Roth, Nov. Pl. Sp.* (1821) p. 229. A nearly glabrous annual; stems numerous, spreading from the root, 4–10 in. long, whitish, slender, leafy, glabrous, brittle, dichotomously branched. Leaves opposite, $\frac{1}{8}$–$\frac{1}{4}$ in. long, often nearly as broad as long, coriaceous, obliquely oblong, rounded-oblong, or subquadrate, rounded, subtruncate or retuse at the apex, usually entire, often with pink margins; stipules 2-partite or laciniately toothed. Involucres numerous, subsolitary, axillary, $\frac{1}{25}$ in. long, broadly campanulate, glabrous; stalk $\frac{1}{10}$–$\frac{1}{20}$ in. long; lobes triangular, apiculate; gland very shortly stipitate with a small limb. Capsules $\frac{1}{16}$ in. in diam., glabrous, keeled; styles short, deeply 2-fid. Seeds scarcely $\frac{1}{20}$ in. long, obtusely quadrangular, very bluntly pointed, yellowish-brown, smooth, mucous when wetted. Fl. B. I. v. 5, p. 252; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 923; Watt, Dict. Econ. Prod. v. 3, p. 296. *Euphorbia uniflora*, Dalz. & Gibs. p. 227 (*not* of Roxb.).

KONKAN: *Law!*; *Stocks!*; Dasgaon, *Dalzell & Gibson.*—DISTRIB. India (Bengal, Behar, Tirhut, W. Peninsula); Java.

21. **Euphorbia Clarkeana,** *Hook. f. Fl. B. I.* v. 5 (1887) p. 253. Glabrous; stems filiform, 3–8 in. long, numerous, prostrate and spreading (rarely suberect), leafy from an annual root, glabrous or nearly so. Leaves coriaceous, distichously spreading, $\frac{1}{6}$–$\frac{3}{8}$ by $\frac{1}{20}$–$\frac{1}{8}$ in., often crowded towards the ends of short branches, obliquely linear-oblong, entire or toothed at the rounded tip, glabrous, base very unequal-sided, almost auricled at one side; petioles very short; stipules rather large, setaceous from a broad toothed base. Involucres axillary, solitary, $\frac{1}{30}$ in. long, campanulate, glabrous; lobes lanceolate, toothed, longer than the gland; gland minute without a limb. Capsules glabrous, $\frac{1}{16}$ in. in diam.; cocci keeled. Seeds $\frac{1}{20}$ in. long, acutely 4-angled, shortly bluntly pointed, obscurely transversely rugose, pale-brown, mucous when wetted. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369.

SIND: *Stocks!*—DISTRIB. India (Panjáb, W. Peninsula).

Euphorbia pulcherrima, Willd. ex Klotzsch, in Otto & Dietr. Allg. Gartenz. v. 2 (1834) p. 27. An unarmed shrub, a native of America, with slender woody branches naked below. Upper floral leaves opposite, brightly colored, crimson or occasionally yellowish-white. Much grown in gardens as an ornamental plant on account of its showy floral leaves. Fl. B. I. v. 5, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369 & Gard. in Ind. ed. 5, p. 433; Prain, Beng. Pl. p. 922; Watt, Dict. Econ. Prod. v. 3, p. 299. *Poinsettia pulcherrima*, R. Grah. in Edinb. N. Phil. Journ. v. 20 (Jan. 1836) p. 412; Dalz. & Gibs. Suppl. p. 76.—Flowers in the cold season.

Euphorbia Tirucalli, Linn. Sp. Pl. (1753) p. 452. The common smooth *Milk-bush*, a native of Africa. Grows to the height of 20 ft. with spreading cylindric rush-like smooth green almost leafless branches. Used as a hedge plant and, though unarmed, makes a good fence, as cattle avoid it owing to its acrid milky juice. The older stems are often used for rafters, as the wood is strong and not liable to the attacks of insects. The wood is also used for making toys. Fl. B. I. v. 5, p. 254;

Grah. Cat. p. 179; Dalz. & Gibs. Suppl. p. 76; Talb. Trees, Bomb. ed. 2, p. 297; Prain, Beng. Pl. p. 922; Watt, Dict. Econ. Prod. v. 3, p. 301.—Flowers: Aug.-Sept. VERN. *Sher.*

Euphorbia splendens, Boj. ex Hook. in Bot. Mag. (1829) t. 2902. A shrub, a native of Madagascar, with a much-branched stem and numerous long straight sharp thorns, alternate spathulate mucronate leaves, and scarlet showy flowers in dichotomous cymes. Dalz. & Gibs. Suppl. p. 76; Woodr. Gard. in Ind. ed. 5, p. 433.—Flowers: Jan.-Mar.

Euphorbia heterophylla, Linn. Sp. Pl. (1753) p. 453. An annual bushy herb, a native of N. America, in gardens and as an escape. Leaves of stem all alternate. Floral leaves opposite, green towards the apex, scarlet, crimson or rose-colored towards the base. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 922.—Flowers: Sept.-Mar.

Euphorbia geniculata, Orteg. Nov. Pl. Hort. Matrit. Dec. (1797) p. 18. An annual herb, a native of Tropical America, occasionally occurring as a weed in gardens. Leaves alternate in the lower, opposite in the upper part. Floral leaves narrower, green towards the apex, pale near the base. Fl. B. *I.* v. 5, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 922.—Flowers: Oct.-Mar.

2. **BISCHOFIA,** Blume.

A large tree. Leaves alternate, 3-foliolate; leaflets often crenate. Flowers minute, diœcious, in axillary or lateral paniculate racemes, the males scattered or clustered, with short pedicels, the females with longer pedicels. MALE FLOWERS: Sepals 5, concave, obtuse, imbricate, concealing the anthers. Petals 0. Disk 0. Stamens 5; filaments short; anthers large, the cells parallel. Pistillode short, broad. FEMALE FLOWERS: Sepals 5, ovate. Staminodes small or obsolete. Ovary exserted, 3-4-celled; ovules 2 in each cell; styles long, linear, stout, entire, stigmatic throughout on the inner face. Fruit a globose fleshy berry with 3-4 cells lined with a parchment-like 2-valved endocarp. Seeds turgidly oblong; testa crustaceous; albumen fleshy; cotyledons broad, flat; radicle straight, elongate.—DISTRIB. India (Sub-Himalayan forests and outer hills, Chota Nagpur, Assam, Birma, Chittagong, W. Peninsula); Malay and Pacific Islands; species 1.

1. **Bischofia javanica,** *Blume, Bijdr* (1826) p. 1168. A large deciduous tree with a tall erect cylindric trunk often of great girth; bark dark-colored; branches spreading, forming a large shady head. Leaves 3-foliolate, alternate; common petiole 3-6 in. long; leaflets 3-6 by 1½-3 in., elliptic, acuminate, crenate, glabrous; main nerves 6-8 pairs, slender; petiolules of lateral leaflets ⅜-⅝ in., those of the terminal leaflets reaching 1½ in. long. Flowers green, in axillary and lateral pedunculate paniculate racemes. MALE FLOWERS: Pedicels very short, slender. Sepals 5, obovate, concave, $\frac{1}{20}$ in. long. Stamens 5; filaments short; anthers globular. Pistillode short, broad. FEMALE FLOWERS: Pedicels longer than in the male, stout, elongating in fruit. Sepals ovate, subobtuse, $\frac{1}{10}$ in. long, not persistent in fruit. Styles nearly ⅓ in.

long, linear. Fruit globose, fleshy, ¼–⅓ in. in diam., on long thickened pedicels, reddish-brown, 3–4-celled. Seeds 3 or 4, smooth, shining, brown, ⅙ in. long. Fl. B. I. v. 5, p. 345; Bedd. Flor. Sylvat. t. 259; Talb. Trees, Bomb. ed. 2, p. 306; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 926; Watt, Dict. Econ. Prod. v. 1, p. 454. *Bischoffia trifoliata*, Hook. Icon. Pl. t. 844. *Stylodiscus trifoliatus*, Benn. Pl. Jav. Rar. p. 133, t. 29; Dalz. & Gibs. p. 235.—Flowers: Mar.–Apr. VERN. *Bok.*

KONKAN: *Stocks!*, *Law!* S. M. COUNTRY: Chorla Ghát, plentiful, *Dalzell & Gibson.* KANARA: evergreen forests of N. Kanara, common on the Ghâts, *Talbot*; Ambgaon, *Ritchie*, 1341!—DISTRIB. of the genus.

The tree furnishes a very beautiful wood which does not warp and deserves attention (*Brandis*).

3. **BRIDELIA,** Willd.

Shrubs or trees. Leaves alternate, usually quite entire, sometimes with strong nerves and prominent cross veins. Flowers monœcious or dioecious, small or minute, in axillary or spicate clusters, sessile or shortly pedicellate; bracts small, scale-like. MALE FLOWERS numerous. Perianth double. Calyx-segments 5, valvate. Petals 5, short, scale-like, stalked or spathulate. Disk broad, pulvinate or adnate to the calyx-tube. Stamens 5; filaments connate below in a column, which bears a terminal pistillode, free and spreading above; anther-cells 2, parallel. FEMALE FLOWERS few or solitary. Calyx-segments usually narrower than in the male. Disk double, the inner forming a membranous central truncate cone often enclosing the young ovary. Ovary 2 (rarely 3)-celled, glabrous; ovules 2 in each cell; styles free or shortly united below, forked or subentire. Fruit a small drupe with 1–2 usually single-seeded cocci or pyrenes. Seed with usually fleshy, sometimes membranous albumen; cotyledons thin or fleshy.—DISTRIB. Species about 30, Tropical African, Asiatic, and Australian.

Flowers dioecious.
- A tree; main nerves of leaves 15–25 pairs, straight; calyx glabrous ..... 1. *B. retusa.*

Flowers monœcious.
- A large climbing shrub; main nerves of leaves 6–12 pairs, slightly arching; calyx hairy; drupe oblong; style-arms long, slender ..... 2. *B. stipularis.*
- A straggling shrub; main nerves of leaves 5–9 pairs, straight, branched; calyx glabrous; drupe globose; style-arms short, thick ..... 3. *B. Hamiltoniana.*

1. **Bridelia retusa,** *Spreng. Syst. Veg.* v. 3 (1826) p. 48. A small or moderate-sized deciduous tree, spinous when young; bark grey. Leaves numerous, 3–6 by 1½–2½ in., rigidly coriaceous, elliptic-oblong, obtuse, subacute or rounded at the apex, with entire or slightly crenulate margins, bright green and glabrous above (turning pinkish-brown before falling), glaucous and usually finely tomentose beneath, base usually rounded (rarely cordate); main nerves prominent, straight, 15–25 pairs with finely reticulate venation between; petioles ¼–½ in. long; stipules ovate-lanceolate, usually oblique at the base, deciduous. Flowers dioecious, greenish-yellow, sessile or shortly pedicellate, crowded in dense axillary clusters or on long axillary or terminal, sometimes

paniculate spikes often exceeding the leaves. Calyx greenish, tinged with red, $\frac{1}{8}$ in. in diam., glabrous; segments fleshy, triangular-ovate, acute, spreading. Petals greenish-white, those of the male flowers obovate, pectinate, those of the female flowers subspathulate. Disk of male flowers thick and pulpy, of the female flowers truncate, enclosing the ovary. Style short. Drupe fleshy, seated on the persistent slightly enlarged calyx, $\frac{1}{3}$ in. in diam., purple-black, edible. Fl. B. I. v. 5, p. 268; Bedd. Flor. Sylvat. t. 260; Trim. Fl. Ceyl. v. 4, p. 10; Talb. Trees, Bomb. ed. 2, p. 298; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 927; Watt, Dict. Econ. Prod. v. 1, p. 536. *Bridelia spinosa*, Willd. Sp. Pl. v. 4 (1805) p. 979; Grah. Cat. p. 184. *B. montana*, Grah. Cat. p. 184 (*not* of Willd.); Dalz. & Gibs. p. 233.—Flowers: May–Oct. VERN. *Asána*; *Kutgi*.

The earliest name of this plant under *Bridelia* is *B. spinosa*, Willd.

Tolerably common on the Konkan hills. KONKAN: *Law*!, *Stocks*!, *Lambert*!; Elephanta, *Graham*; Matheran, *Cooke*! DECCAN: Khandala, *Cooke*!; Mahableshwar, *Cooke*!—DISTRIB. Throughout India; Ceylon.

2. **Bridelia stipularis,** *Blume*, *Bijdr.* (1825) p. 597. A large climbing shrub, sometimes with aërial roots (*Talbot*); bark dark-grey; stems 2–8 in. in diam.; branches sometimes with long deflexed spines; young branches long, slender, usually fulvous-tomentose. Leaves 1–4 by $\frac{1}{2}$–2 in., subcoriaceous, elliptic-oblong or obovate, obtuse or subacute, often with shallowly crenate margins, glabrous above, pale and pubescent beneath; main nerves 6–12 pairs, slightly arching, the transverse veins at right angles, parallel; petioles $\frac{1}{6}$–$\frac{3}{8}$ in. long. Flowers monœcious, greenish-yellow, in small dense axillary clusters or long spikes, often subtended by stipular hairy obliquely lanceolate acute bracts $\frac{1}{8}$ in. long. Calyx $\frac{1}{5}$ in. long, hairy outside; segments triangular-ovate, acute, connate at the base. Petals $\frac{1}{16}$ in. long, broadly obovate or suborbicular, shortly cuneate at base, crenulate at apex. Staminal-column $\frac{1}{8}$ in. long to top of anthers. Styles with long slender arms. Drupe $\frac{3}{8}$ in. long or more, ellipsoid-oblong, seated on the slightly enlarged calyx, black and juicy when ripe. Fl. B. I. v. 5, p. 270; Bedd. For. Man. in Flor. Sylvat. p. cci; Talb. Trees, Bomb. ed. 2, p. 298; Prain, Beng. Pl. p. 927; Watt, Dict. Econ. Prod. v. 3, p. 536. *Bridelia scandens*, Willd. Sp. Pl. (1805) p. 979; Grah. Cat. p. 184; Dalz. & Gibs. p. 233; Trim. Fl. Ceyl. v. 4, p. 11. *B. montana*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369 (*not* of Willd.). *Clutia stipularis*, Linn. Mantiss. p. 127.—Flowers: Oct.–Dec. VERN. *Patharpoda*.

The earliest name of this plant under *Bridelia* is *B. scandens*, Willd.

KONKAN: hilly parts, *Dalzell & Gibson*; hills about Nagotna, *Graham*; Ambeghát, *Woodrow*. DECCAN: hills about Pár, *Graham*. S. M. COUNTRY: Dharwar, *Cooke*!; Belgaum, *Cooke*! KANARA: banks of the Gatpraba River, *Law* ex *Graham*.—DISTRIB. Throughout India; Ceylon, Malay Islands, Philippines, Tropical Africa.

3. **Bridelia Hamiltoniana,** *Wall. Cat.* (1828) 7882. A straggling nearly glabrous shrub. Leaves $1\frac{1}{2}$–$3\frac{1}{2}$ by $\frac{3}{4}$–$1\frac{3}{4}$ in., elongate-elliptic or obovate-elliptic or rhomboid, obtuse, entire or slightly crenulate, glabrous, base cuneately narrowed into the petiole; main nerves 5–9 pairs, nearly straight, branched, with reticulate venation between; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long; stipules lanceolate-subulate, $\frac{1}{12}$–$\frac{1}{8}$ in. long. Flowers in minute axillary and spicate sessile clusters. Calyx $\frac{1}{8}$ in. long, glabrous;

segments triangular-ovate, acute, connate at the base. Petals of male flowers orbicular-rhomboid, those of female flowers $\frac{1}{16}$–$\frac{1}{12}$ in. long, ovate, acute. Styles 2, distinct, $\frac{1}{25}$ in. long, shortly and bluntly 2-fid. Drupe globose, $\frac{1}{4}$ in. in diam., seated on the unaltered calyx, black. Fl. B. I. v. 5, p. 271; Bedd. For. Man. in Flor. Sylvat. p. cciі; Talb. Trees, Bomb. ed. 2, p. 298; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369. —Flowers: Aug.–Nov.

Prain (Beng. Pl. p. 927) unites this with *B. montana*, Willd., but the difference between that species and the specimens of *B. Hamiltoniana* from W. India is so marked that I doubt if he could have had any Bombay specimens to examine.

KONKAN: *Law*!, *Lambert*!, *Dalzell*!, *Stocks*!; Shrivardhan (Colaba districts), *Woodrow*!; Matheran, *Cooke*!, *Woodrow*. GUJARAT: *Kanitkar*!—DISTRIB. India (Behar, W. Peninsula).

4. **CLEISTANTHUS,** Hook. f.

Trees or shrubs. Leaves alternate, bifarious, entire. Flowers monœcious, small or minute, in axillary clusters or spikes, all sessile or the females shortly pedicellate. MALE FLOWERS: Calyx-segments 5, valvate. Petals 5, short, scale-like, stalked or spathulate. Disk broad, entire or sinuate. Stamens 5; filaments connate below in a central column, bearing a pyramidal or 3-lobed pistillode, free and spreading above; anther-cells parallel. FEMALE FLOWERS: Calyx less deeply lobed than in the male, cupular under the ovary. Disk double, the inner conic or turbinate, more or less enclosing the young ovary. Ovary 3 (rarely 4)-celled, usually clothed with long hairs; ovules 2 in each cell; styles 3, free, 2-fid. Fruit a sessile or stipitate subglobose or depressed capsule with three 2-valved cocci. Seeds without an aril or arillode; albumen copious or scanty; cotyledons thin or fleshy, often folded.—DISTRIB. Tropical India, Malaya, Africa; species about 30.

1. **Cleistanthus malabaricus,** *Muell. Arg. in DC. Prodr.* v. 15, part 2 (1866) p. 508. A large shrub or small tree; young branches densely rufous-villous. Leaves $2\frac{1}{2}$–6 by $\frac{7}{8}$–$1\frac{3}{4}$ in., oblanceolate, acuminate, glabrous or slightly hairy above, glaucous and thinly hairy beneath, narrowed into a short rufous-villous petiole less than $\frac{1}{8}$ in. long; main nerves 6–10 pairs, arched; stipules $\frac{1}{6}$–$\frac{1}{5}$ in. long, linear-lanceolate. Flowers few, in axillary clusters. Calyx of female flowers $\frac{1}{6}$–$\frac{1}{4}$ in. long, glabrous; segments lanceolate, acute, connate at the base. Petals of female flowers $\frac{1}{10}$ in. long, obovate, clawed. Capsules more than $\frac{1}{4}$ in. long, sparsely fulvous-hairy, 3 (sometimes 4)-celled (*Talbot*), deeply 3-lobed at the top and sides, subglobose. Seeds rugose, 3-angled. Fl. B. I. v. 5, p. 276; Bedd. For. Man. in Flor. Sylvat. p. cciii; Talb. Trees, Bomb. ed. 2, p. 299; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Watt, Dict. Econ. Prod. v. 2, p. 369.—Flowers: Nov.–Jan.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks*!, *Law*! KANARA: *Law*!; in the evergreen forests of N. Kanara, usually near streams and rivers, *Talbot*; Falls of Gairsoppa, common near the river-bank above the great fall, *Talbot*!—DISTRIB. India (W. Peninsula).

5. **ACTEPHILA,** Blume.

Trees or shrubs. Leaves alternate, usually large, entire; stipules deciduous. Flowers monœcious or casually diœcious, in axillary clusters; males numerous, shortly pedicellate; females solitary or few with long pedicels. MALE FLOWERS: Perianth usually double. Sepals 5–6, subequal or the inner larger, imbricate. Petals 5–6, small, scale-like or 0. Disk broad, entire or 5-lobed. Stamens 3–6, inserted on the disk; filaments free or nearly so; anther-cells parallel. Pistillode 3-cleft. FEMALE FLOWERS: Perianth as in the male. Ovary 3-celled, sessile on the 5-lobed disk; ovules 2 in each cell; styles short, free or connate, entire or 2-fid. Fruit a hard loculicidal capsule of three 2-valved cocci. Seed usually solitary in each coccus, large, 3-gonous, without aril or arillode; testa thin, brittle; albumen scanty or 0; cotyledons fleshy, plicate or corrugate.—DISTRIB. India, Malaya, Australia; species about 10.

1. **Actephila excelsa,** *Muell. Arg. in Linnæa*, v. 32 (1863) p. 78. A shrub or small tree; bark greyish-brown, lenticellate; young parts glabrous or nearly so. Leaves 3–7 by 1½–3 in., coriaceous, elliptic, obovate or oblanceolate, subacute or acuminate, glabrous, base acute; main nerves 8–12 pairs, arched, slender; petioles ⅓–¾ in. long; stipules small, acuminate from a broad base, deciduous. Flowers usually monœcious, the males and females usually in the same cluster, the male flowers on short pedicels, the females on pedicels ¾–1½ in. long. Calyx-segments broadly ovate, obtuse. Petals obovate, cuneate, sometimes incised or 2-fid. Ovary globose, 3-lobed; styles 3, bifid, divaricate. Capsules ¾–1¼ in. in diam., depressed-globose, 3-lobed, glabrous, minutely wrinkled when dry, seated on the persistent calyx. Seeds ½ in. long, obtusely trigonous, dorsally rounded, brown. Fl. B. I. v. 5, p. 282; Bedd. For. Man. in Flor. Sylvat. p. clxxxix & Anal. Gen. t.-23, fig. 3; Talb. Trees, Bomb. ed. 2, p. 299; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 929. *Actephila neilgherrensis*, Wight, Icon. (1852) t. 1910; Trim. Fl. Ceyl. v. 4, p. 14. *Anomospermum excelsum*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 228 & Bomb. Flor. p. 233.—Flowers: Aug.–Sept.

The earliest name of the plant under the genus *Actephila* is *A. neilgherrensis*, Wight.

KONKAN: *Stocks*!, *Dalzell*!; Sayhadri hills, *Dalzell*!; Phonda Ghát, *Dalzell*. S. M. COUNTRY: Castlerock, *Woodrow*.—DISTRIB. India (Assam, Birma, Chittagong, Cachar, Andamans, W. Peninsula); Ceylon, Java.

6. **ANDRACHNE,** Linn.

Herbs, undershrubs, or slender shrubs. Leaves alternate, petiolate, membranous, usually small, entire. Flowers small, monœcious, pedicellate; male flowers clustered in the axils; females solitary. MALE FLOWERS: Perianth usually double. Calyx 5–6-lobed or -partite. Petals 5–6, small or 0. Glands of the disk as many or twice as many as the petals. Stamens 5–6, alternate with the petals; anthers erect, the cells parallel. Pistillode small. FEMALE FLOWERS: Calyx-segments usually larger than in the male. Petals minute or 0. Ovary 3-celled; ovules

2 in each cell; styles short, 2-fid or 2-partite. Capsule of three 2-valved cocci. Seeds curved, rugose, estrophiolate; albumen fleshy; embryo curved; cotyledons broad, flat.—DISTRIB. Species about 10, variously dispersed.

1. **Andrachne aspera,** *Spreng. Syst. Veg.* v. 3 (1826) p. 884. A small somewhat glaucous undershrub; stems numerous from a thick woody root, prostrate or ascending, very slender, 4–12 in. long, clothed with short glandular hairs. Leaves orbicular or more commonly reniform, usually broader than long, ¼–½ by ⅜–⅝ in., gradually smaller upwards, obtuse, shortly glandular-hairy, base cordate; petioles of the lower leaves ¼ in. long or more, filiform, those of the upper leaves very short; stipules minute, lanceolate, hairy. Calyx 5-partite, hairy; sepals $\frac{1}{10}$ in. long, lanceolate, obtuse, ciliate. Petals when present shorter than the calyx. Glands of the disk fleshy, those of the male flowers peltate, incised, those of the female obovate, truncate. Capsules ⅛ in. in diam., globose, hairy, on filiform pedicels reaching ⅛ in. long; styles three, 2-partite to the base, $\frac{1}{30}$ in. long. Seeds 3-gonous, nearly white, reaching $\frac{1}{10}$ in. long, curved, rounded on the back, rugose. Fl. B. I. v. 5, p. 284; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369.—Flowers: Aug.

SIND: *Stocks!*; hills at the Hub near Karachi, *Bhola Puran!*; Laki, *Woodrow!*—DISTRIB. Persia, Arabia, Tropical Africa.

7. GLOCHIDION, Forst.

Evergreen trees or shrubs. Leaves alternate, bifarious, shortly petiolate, entire. Flowers small, monœcious or dicœcious, in axillary clusters. Perianth simple. Petals 0. Disk 0. MALE FLOWERS: Sepals 6 (rarely 5), spreading, in 2 series, imbricate. Stamens connate in an ellipsoid or oblong sessile column; anthers 3–8 (sometimes more), the cells linear, dehiscing extrorsely; connectives produced as free points or connate in an umbonate head. Pistillode 0 or rarely minute and hidden between the anthers. FEMALE FLOWERS: Calyx usually of 6 short imbricate sepals or shortly tubular and unequally toothed or cleft. Ovary 3–15-celled; ovules 2 in each cell; styles connate in a globose, columnar conic or subclavate column, lobed or toothed at the tip. Fruit a capsule of 3 or more 2-valved cocci, often with twice as many lobes as cells, globose or orbicular and depressed, or intruded at the base and apex, crowned by the often enlarged style; cocci coriaceous or crustaceous, the epicarp separable or not. Seeds hemispheric or laterally compressed; testa crustaceous with often a succulent coat; albumen copious, fleshy; cotyledons flat.—DISTRIB. Species about 120, chiefly tropical Asiatic.

Anthers 4 or more; sepals of female flowers 5–6, distinct or connate at the base only.
- Flowers in axillary fascicles; capsules pubescent or hoary.
  - Branchlets, leaves beneath, and flowers glabrous; capsules ¾ in. in diam., hoary ..... 1. *G. lanceolarium.*
  - Branchlets, leaves beneath, and flowers pubescent; capsules ¼–⅓ in. in diam., pubescent ..... 2. *G. tomentosum.*
- Flowers in umbellate clusters, on short usually supra-axillary peduncles; capsules glabrous ..... 3. *G. zeylanicum* var. *nitidum.*

Anthers 3; sepals 5–6, distinct or connate at the base only.	
Female flowers pedicellate; branchlets pubescent	4. *G. velutinum.*
Female flowers sessile or nearly so; branchlets glabrous.	
Stipules subulate; style pubescent; capsules reaching ⅛ in. in diam.	5. *G. malabaricum.*
Stipules triangular; style glabrous; capsules ⅛–⅓ in. in diam.	6. *G. ellipticum.*
Anthers 3; calyx irregularly 4–6-toothed or -lobed.	
Calyx glabrous; capsules ⅜ in. in diam., 6–8-lobed	7. *G. Hohenackeri.*
Calyx pubescent; capsules ¼ in. in diam., irregularly and slightly 3-lobed	8. *G. Johnstonei.*

1. **Glochidion lanceolarium,** *Voigt, Hort. Suburb. Calc.* (1845) p. 153. A middle-sized evergreen tree; branchlets angular, glabrous. Leaves coriaceous, 3–6 by 1½–2¼ in., elliptic-oblong or elliptic-lanceolate, acuminate, shining, glabrous, base acute; nerves 6–10 pairs, slender; petioles ¼–½ in. long; stipules triangular, acuminate. Flowers in axillary fascicles. MALE FLOWERS numerous, glabrous. Pedicels ½–¾ in. long, filiform. Sepals ⅕ in. long, linear-oblong. Anthers 4–6; connectives acute, ¼ the length of the anther. FEMALE FLOWERS few, sessile, mostly in the upper axils, a few mixed with the males. Sepals glabrous, unequal, rigidly coriaceous, cuspidate. Ovary hairy, usually 6 (sometimes 7–8)-celled, narrowed gradually into the conic-cylindric style, which is glabrous near the 6-toothed apex. Capsules orbicular, depressed, usually 6-celled and 12-lobed, ¾ in. in diam., hoary. Fl. B. I. v. 5, p. 308; Prain, Beng. Pl. p. 930; Watt, Dict. Econ. Prod. v. 3, p. 506.

The occurrence of this tree in the Bombay Presidency seems very doubtful. The tree called *G. lanceolarium* by Dalzell is *G. Hohenackeri*, Bedd. Talbot (Trees, Bomb. ed, 2, p. 301) says that *G. lanceolarium* is common on the Konkan and N. Kanara Ghâts, but I think it will be found that the *Bhoma* which occurs there is *G. Hohenackeri*, Bedd., which differs from *G. lanceolarium* in the number of anthers, the size of the capsules, and the glabrous ovary. See remarks under *G. Hohenackeri*, No. 7.

2. **Glochidion tomentosum,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 38. A shrub or small tree; branchlets, leaves beneath, and flowers finely pubescent. Leaves 2–6 by 1–2½ in., elliptic-oblong or ovate-oblong, acute or acuminate, base usually rounded; main nerves 6–8 pairs; petioles ⅛–⅙ in. long; stipules lanceolate, acute, hairy. Flowers pedicellate, in axillary fascicles, the males few. MALE FLOWERS: Pedicels ⅜ in. long. Sepals 6, fleshy, ⅛ in. long, the 3 outer hairy outside, ciliolate, broadly rotund-ovate, twice as broad as the 3 inner, which are oblong or obovate-oblong, rounded at the apex, glabrous on the back. Staminal-column $\frac{1}{12}$ in. high; anthers 5–7; connectives about $\frac{1}{50}$ in. long, acute. FEMALE FLOWERS: Pedicels ⅙ in. long. Sepals 4–6, about ⅛ in. long; when 6 the 3 outer ovate, subacute, hairy outside and ciliate, thick and fleshy, $\frac{1}{12}$ in. broad, the three inner about half as broad as the outer, oblong, often apiculate; when sepals are 4 one of them only like the inner of the 6. Ovary spherical, sulcate, 5-celled; style stout, conical, 4–5-cleft at the tip. Capsules ¼–⅓ in. in diam., depressed-globose, obscurely 10–12-lobed, pubescent. Fl. B. I. v. 5, p. 309; Bedd. For. Man. in Flor. Sylvat. p. excii; Talb. Trees, Bomb. ed. 2, p. 302; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370.—Flowers: Dec.–Feb.

KONKAN: *Stocks*!, *Law*! KANARA: *Dalzell*; Yellapur, *Talbot*, 481!; Falls of Gairsoppa, *Talbot*, 2645!—DISTRIB. India (W. Peninsula).

3. **Glochidion zeylanicum,** *A. Juss. Tent. Euphorb.* (1824) p. 107. VAR. **nitidum,** *Hook. f. Fl. B. I.* v. 5 (1887) p. 311. A small nearly glabrous tree; stem 1 ft. in diam.; bark thin, grey, corky. Leaves 3½–7 by 1½–2¼ in., oblong, obtuse or bluntly acuminate, glabrous, bright apple-green and shining above, paler beneath, base unequal-sided, usually rounded; main-nerves 8–10 pairs; petioles ⅙–¼ in. long, stout; stipules triangular, acute, ⅛ in. long. Flowers shortly pedicellate, the male and female together in umbellate clusters on very short usually supra-axillary peduncles, the female flowers the more numerous. Sepals 5–6 in both sexes, broadly ovate-oblong, rounded at the apex, 1/10–⅛ in. long, fleshy, glabrous, similar in both sexes. Staminal-column 1/20 in. high; anthers 5–7. Ovary 4–7-celled; styles connate into a short cone, 6–8-toothed at the apex. Capsules ⅜–⅔ in. in diam., subglobose, pedicellate, obscurely lobed, glabrous. *Glochidion zeylanicum*, Talb. Trees, Bomb. ed. 2, p. 302; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370. *G. nitidum* Dalz. & Gibs. Bo. Fl. (1861) p. 235; Bedd. For. Man. in Flor. Sylvat. p. excii. —Flowers: Oct.–June.

KONKAN: near water in the S. Konkan, *Dalzell & Gibson*; Vingorla, *Dalzell*! KANARA: N. Kanara Ghâts along streams and watercourses, both in evergreen and deciduous forests, *Talbot*; Yellapur and Jagalbet, *Woodrow*.—DISTRIB. India (W. Peninsula).

4. **Glochidion velutinum,** *Wight, Icon.* v. 5, part 2 (1852) p. 29, t. 1907–2. A small tree 26–30 ft. high; young branches, under surface of the leaves, petioles, and inflorescence clothed with short velvety pubescence. Leaves thinly coriaceous, 2–4½ by 1⅛–2¼ in., elliptic-oblong or elliptic-lanceolate, acute, obtuse or shortly acuminate, base usually acute; main nerves 6–8 pairs, conspicuous; petioles ⅛ in. long; stipules triangular, cuspidate. Flowers in axillary clusters, the males and females together. MALE FLOWERS: Pedicels often ¼ in. long, slender, pubescent. Sepals ⅛ in. long, ovate, subacute, keeled and pubescent on the back. Staminal-column 1/16 in. high; anthers 3, connate in the lower half; connectives acute, 1/20 in. long. FEMALE FLOWERS: Pedicels 0–⅙ in. long, pubescent. Ovary and style pubescent; style enlarged at the truncate 4–7-toothed tip, longer than the ovary. Capsules ½ in. in diam., orbicular, depressed, 4–7-celled and 4–7-lobed, sessile or pedicellate, often leaving the bright red seeds on the tree. Fl. B. I. v. 5, p. 322; Bedd. For. Man. in Flor. Sylvat. p. cxcv; Talb. Trees, Bomb. ed. 2, p. 303; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 930; Watt, Dict. Econ. Prod. v. 3, p. 506. —Flowers: Dec.–Mar.

Dalzell without locality in Herb. Kew. KONKAN: *Law*!; Ghâts, *Stocks*! S. M. COUNTRY: Londa, *Woodrow*. KANARA: *Ritchie*, 139!; Jagalbet, *Talbot*, 21!—DISTRIB. India (hot valleys of the Himalaya, Birma, Khasia Hills, W. Peninsula).

5. **Glochidion malabaricum,** *Bedd. For. Man. in Flor. Sylvat.* (1872) p. cxciv. A small tree; branchlets glabrous. Leaves 3–5 by 1¼–2 in., elliptic-oblong or elliptic-lanceolate, acuminate, glabrous, base usually subacute; main nerves 6–8 pairs, arching; petioles ⅛–⅙ in. long; stipules lanceolate-subulate. Flowers axillary, in dense clusters. MALE FLOWERS: Pedicels reaching ½ in. long, filiform. Calyx divided almost to the base; sepals 6, fleshy, ⅙ by 1/20 in., oblanceolate-oblong. Staminal-column 1/16 in. high; anthers free; connectives about 1/40 in. long, tri-

angular, acute. FEMALE FLOWERS sessile (rarely pedicellate), in dense clusters from which the males arise. Sepals $\frac{1}{10}$ by $\frac{1}{20}$ in. long, linear-oblong, obtuse. Ovary pubescent, shorter than the style; style exserted, pubescent, cylindric or conic, 4–7-toothed at the apex. Capsules reaching $\frac{1}{2}$ in. in diam., orbicular, depressed, 3–5-lobed, pubescent, shortly pedicellate. Fl. B. I. v. 5, p. 319; Talb. Trees, Bomb. ed. 2, p. 303; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370.

KONKAN: *Stocks*!, *Law*!, *Talbot*. KANARA: *Law*!; N. Kanara Ghâts, *Talbot*.—DISTRIB. India (W. Peninsula), apparently endemic.

6. **Glochidion ellipticum,** *Wight, Icon.* v. 5, part 2 (1852) p. 29, t. 1906. A shrub or small tree; branchlets slender, angled, glabrous. Leaves 3–4¼ by 1–1½ in., elliptic-lanceolate, acuminate, glabrous, base acute, often unequal-sided; main nerves 6–8 pairs, slender; petioles $\frac{1}{8}$ in. long; stipules triangular-hastate. Flowers in axillary clusters, males and females together. MALE FLOWERS: Pedicels $\frac{1}{4}$–$\frac{3}{8}$ in. long, slender, glabrous or pubescent. Sepals 6, ovate, obtuse, $\frac{1}{16}$–$\frac{1}{12}$ in. long, glabrous. Staminal-column $\frac{1}{20}$ in. high; anthers 3, free; connectives $\frac{1}{60}$ in. long, acute. FEMALE FLOWERS: Pedicels 0 or very short. Sepals $\frac{1}{16}$ by $\frac{1}{40}$ in., linear-oblong, obtuse or subacute, pubescent. Style conical, $\frac{1}{30}$–$\frac{1}{20}$ in. long, glabrous or nearly so, 6-toothed at the apex. Capsules $\frac{1}{5}$–$\frac{1}{3}$ in. in diam., depressed-globose, 4-lobed, pubescent. Fl. B. I. v. 5, p. 321; *Talb. Trees*, Bomb. ed. 2, p. 303; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370.—Flowers: Dec.–Feb.

In the Flora of B. I. l. c. the capsules are said to be $\frac{1}{2}$ in. in diam., which seems an error. In an excellent fruiting specimen from Ainshi, N. Kanara (*Talbot*, 1856!), the capsules are less than $\frac{1}{4}$ in. in diam., and the male pedicels are pubescent, while Wight's figure shows small capsules, and Talbot (Trees, Bomb. l. c.) calls them *very small*.

KANARA: Ainshi Ghât of N. Kanara, *Talbot*, 1856!, *Woodrow*.—DISTRIB. India (W. Peninsula), apparently endemic.

7. **Glochidion Hohenackeri,** *Bedd. For. Man. in Flor. Sylvat.* (1873) p. cxciii. A middle-sized tree quite glabrous. Leaves 2½–6 by 1–1¾ in., elliptic-lanceolate, acutely or obtusely acuminate, base usually acute; main nerves 6–10 pairs, slender; petioles $\frac{1}{8}$–$\frac{1}{6}$ in. long; stipules $\frac{1}{8}$–$\frac{1}{6}$ in. long, obliquely triangular, acute. MALE FLOWERS greenish-yellow, on capillary pedicels reaching $\frac{1}{2}$ in. long. Calyx partite nearly to the base; sepals $\frac{1}{6}$ by $\frac{1}{16}$ in., oblanceolate-oblong, rounded at the apex, fleshy. Anthers 3, about $\frac{1}{12}$ in. long, including the produced pointed connective, which is about $\frac{1}{50}$ in. long. FEMALE FLOWERS few, sessile, in small clusters usually of a deeper yellow than the male. Calyx glabrous, $\frac{1}{10}$ in. long, cup-shaped, with 4–6 irregular short lobes or teeth. Ovary glabrous; style subglobose, 3–4-notched at the apex, broader than the ovary. Capsules $\frac{3}{8}$ in. in diam., nearly sessile, turnip-shaped, 6–8-lobed, much depressed in the centre, crowned by the subglobose style in the sunk top. Seeds red, 2 in each cell, $\frac{1}{5}$ in. long, rounded on the back, quite smooth. Fl. B. I. v. 5, p. 314; Talb. Trees, Bomb. ed. 2, p. 302; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370. *Glochidion lanceolarium*, Dalz. in Dalz. & Gibs. Bo. Fl. (1861) p. 235 (*not* of Voigt); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370. *G. Ralphii*, Hook. f. Fl. B. I. v. 5 (1887) p. 314; Talb. Trees, Bomb. ed. 2, p. 302.

Briedelia sinica, Grah. Cat. p. 184.—Flowers: Dec.–Apr. VERN. *Bhoma.*

Dalzell without locality in Herb. Kew. KONKAN: *Gibson*!, *Stocks*!, *Law*!; Ambeghát, *Kanitkar*!; Matheran, *Cooke*! DECCAN: Phonda Ghát, *Ritchie*, 1337!; Mahableshwar, *Cooke*!; Khandala, *Graham*, *Cooke*! KANARA: *Law*!, *Talbot*.—DISTRIB. India (W. Peninsula).

Note.—There is no doubt that this is the tree described by Dalzell as *G. lanceolarium*. Dalzell calls the capsules "*small*," a description which would not apply to the capsules of *G. lanceolarium*. *Glochidion Hohenackeri* is the tree which is so abundant on the Western Ghâts and which may be found at Mahableshwar, Matheran, and Khandala. It has been collected by Stocks, Law, Gibson, Ritchie, and Dalzell. Specimens collected by all these botanists may be found in the Kew Herbarium, whereas, with the exception of a single specimen of doubtful habitat from Herb. Lambert, not a single specimen of *G. lanceolarium*, Voigt, has been sent to Kew by Bombay botanists.

8. **Glochidion Johnstonei,** *Hook. f. Fl. B. I.* v. 5 (1887) p. 314. A small tree 30–40 ft. high; trunk reaching 1½ ft. in diam.; bark dark-colored, rough, fissured; branchlets terete, tomentose. Leaves 3½–4½ by 1½–1¾ in., oblong or elliptic-oblong, obtuse or obtusely acuminate, glabrous above, more or less pubescent on the nerves beneath, base subequal, obtuse or subacute; main nerves 6–8 pairs, slender, with reticulate venation between; petioles $\frac{1}{10}$–$\frac{1}{8}$ in. long; stipules lanceolate, pubescent, deciduous. Flowers in axillary clusters, the males on pubescent filiform pedicels reaching nearly ¼ in. long, the females sessile. MALE FLOWERS: Sepals 5 or 6, subequal, $\frac{1}{8}$–$\frac{1}{6}$ in. long, linear-oblong or obovate-oblong, obtuse or subacute, sparsely hairy outside, fleshy. Staminal-column $\frac{1}{16}$ in. high; anthers 3, the produced connectives about $\frac{1}{60}$ in. long, acute. FEMALE FLOWERS sessile. Calyx $\frac{1}{16}$ in. long, hairy outside, turbinate, irregularly 4–6-lobed or -toothed. Style subglobose, obscurely lobed. Capsules ¼ in. across, depressed-globose, usually irregularly and slightly 3-lobed, the lobes again faintly emarginate, pubescent, crowned with 3 rounded pubescent style-tips. Talb. Trees, Bomb. ed. 2, p. 302.—Flowers: Feb.

KONKAN: *Stocks*!, *Law*! KANARA: Arbail Ghát, *Talbot*; Supa Ghâts near Ammode, *Talbot*, 1804!—DISTRIB. India (W. Peninsula), apparently endemic.

8. FLUGGEA, Willd.

Shrubs unarmed or spiny. Leaves small, alternate, distichous, entire. Flowers dicœcious, minute, pedicellate, axillary, the males numerous, clustered, the females few in lax fascicles. Perianth simple. MALE FLOWERS: Sepals 5, almost petaloid, imbricate. Petals 0. Disk of 5, 4 or 3 glands, alternate with the stamens. Stamens 5 (rarely 4 or 3); filaments free; anthers erect, the cells parallel, dehiscing longitudinally. Pistillode 2–3-fid. FEMALE FLOWERS: Sepals as in the male. Petals 0. Disk flat, annular, toothed. Ovary 1–3-celled; ovules 2 in each cell: styles free, recurved, usually 2-fid. Fruit globose, coriaceous or with a fleshy epicarp, bursting irregularly or into distinct 2-valved cocci. Seeds 3-quetrous with convex backs and acute faces; testa crustaceous; albumen scanty; embryo curved; cotyledons broad, flat.—DISTRIB. Tropics of the Old World; species about 6.

Unarmed; leaves 1–3 in. long	1. *F. microcarpa.*
Spinous; leaves rarely exceeding 1 in. long	2. *F. Leucopyrus.*

1. **Fluggea microcarpa,** *Blume, Bijdr.* (1825) p. 580. A large unarmed glabrous shrub; bark grey, with small lenticular specks; branchlets angular. Leaves variable, thin, 1–3 by $\frac{5}{8}$–$1\frac{3}{4}$ in., elliptic or obovate, rounded, obtuse (rarely subacute), glabrous, somewhat glaucous and reticulately veined beneath, base usually acute; main nerves 5–7 pairs, very slender; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long. Flowers in axillary clusters from a crowd of minute bracts, the males very numerous, the females usually 1–5 (rarely several). MALE FLOWERS: Pedicels filiform, sometimes reaching $\frac{3}{8}$ in. long. Sepals $\frac{1}{16}$ by $\frac{1}{30}$ in., obovate-oblong, obtuse, concave. Stamens 3–5; filaments slender, free, sometimes $\frac{1}{12}$ in. or more long, with alternate glands at the base. Pistillode large, 3-fid. FEMALE FLOWERS: Pedicels rarely reaching $\frac{1}{4}$ in. long. Sepals as in the male. Ovary glabrous, ovoid or subglobose; styles 3, about $\frac{1}{20}$ in. long, deeply divided into 2 linear acute segments. Fruit globose, of 2 kinds, one $\frac{1}{8}$–$\frac{1}{6}$ in. in diam., with a dry pericarp, the other $\frac{1}{3}$ in. in diam., white with a fleshy pericarp which is edible. Seeds rounded on the back with acute faces, very minutely punctulate. Fl. B. I. v. 5, p. 328; Talb. Trees, Bomb. ed. 2, p. 304; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 931. *Fluggea Leucopyrus*, Dalz. & Gibs. p. 236 (*not* of Willd.). *Phyllanthus retusus*, Roxb. Fl. Ind. v. 3, p. 657; Grah. Cat. p. 180. *Chorisandra pinnata*, Wight, Icon. t. 1994. *Securinega obovata*, Muell. Arg. in DC. Prodr. v. 15, part 2, p. 449; Bedd. For. Man. in Flor. Sylvat. p. cxcvii.—Flowers: May–June. VERN. *Pándharphalli.*

Throughout the Presidency widely spread in deciduous forests. SIND: *Stocks*!—DISTRIB. Throughout India; China, Malay Islands, Australia, Tropical Africa.

2. **Fluggea Leucopyrus,** *Willd. Sp. Pl.* v. 4 (1805) p. 757. A large rigid bush with somewhat straggling branches; branchlets angular, slender, leafy, usually ending in sharp spines. Leaves $\frac{5}{8}$–1 by $\frac{1}{2}$–$\frac{5}{8}$ in. (rarely reaching $1\frac{1}{2}$ by 1 in.), obovate, or obcordate, or rotundate, glaucous and reticulately veined beneath. Flowers as in *Fluggea microcarpa*. Fruit globose, about $\frac{1}{4}$ in. in diam., smooth, quite white when ripe, 3-celled; styles 3, bifid. Fl. B. I. v. 5, p. 328; Wight, Icon. t. 1875; Trim. Fl. Ceyl. v. 4, p. 33; Talb. Trees, Bomb. ed. 2, p. 305; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370. *Fluggea virosa*, Dalz. & Gibs. Bo. Fl. (1861) p. 236. *Securinega Leucopyrus*, Muell. Arg. in DC. Prodr. v. 15, part 2, p. 451; Bedd. For. Man. in Flor. Sylvat. p. cxcvii.—Flowers: May. VERN. *Pándharphalli.*

Throughout the Presidency and Sind, usually in open situations, *Talbot.* KONKAN: Malabar and Worli Hills (Bombay), *Dalzell & Gibson.* DECCAN: Parvati Hill near Poona, *Kanitkar*!; near Wadi Station, *Bhiva*!; Purandhar, *Bhiva*!—DISTRIB. India (Panjáb, Birma, W. Peninsula); Ceylon.

9. SAUROPUS, Blume.

Small shrubs or undershrubs. Leaves alternate, distichous, membranous, quite entire; stipules minute, Flowers pedicellate, monœcious, minute, axillary, clustered or solitary. Perianth simple. MALE FLOWERS: Sepals connate in a disk-like urceolate or turbinate 6-lobed or 6-cleft calyx; mouth small with superficial thickenings that meet round the stamens. Petals 0. Disk 0. Stamens 3; filaments connate

in a short truncate 3-gonous column; anthers sessile on the angles of the column, the cells linear or subglobose, dehiscing extrorsely. Pistillode 0. FEMALE FLOWERS: Sepals connate in a 6-cleft accrescent calyx. Petals 0. Disk 0. Ovary ovoid or globose, 3-celled, rounded or concave at the apex; ovules 2 in each cell; styles 3, very short, spreading, 2-fid or 2-partite. Fruit globose or depressed, fleshy or coriaceous, 6-valved or rupturing irregularly, containing 6 indehiscent 3-gonous crustaceous or bony cocci. Seeds with fleshy albumen; embryo straight or nearly so; cotyledons flat, broad.—DISTRIB. India and Malaya; species about 20.

1. **Sauropus quadrangularis,** *Muell. Arg. in Linnæa*, v. 32 (1863) p. 73. A low slender branched shrub 1–1½ ft. high; young shoots angular. Leaves ½–⅞ by ⅓–½ in., thin, elliptic-oblong or obovate, apiculate, base obtuse or acute; main nerves 4–5 pairs; petioles $\frac{1}{20}$ in. long; stipules minute, lanceolate-subulate. MALE FLOWERS: Pedicels filiform, reaching ¼ in. long. Calyx 6-lobed, divided about ½-way down; lobes about $\frac{1}{20}$ in. long, triangular, acute; basal appendages vaulting over the small staminal column. FEMALE FLOWERS solitary from the upper axils. Pedicels short. Calyx divided almost to the base; sepals ⅙ by ⅕ in., obovate, rounded at the apex, veined. Fruit ⅓ in. in diam., depressed-globose; cocci ⅙ in. long, rounded on the back, with acute faces, 3-gonous, smooth, pale. Fl. B. I. v. 5, p. 335; Talb. Trees, Bomb. ed. 2, p. 304; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 932. *Phyllanthus rhamnoides*, Roxb. Fl. Ind. v. 3 (1832) p. 663 (*not* of Willd.). *Ceratogynum rhamnoides*, Wight, Icon. t. 1900 (figure bad); Dalz. & Gibs. p. 234.—Flowers: June–Aug. Vern. *Chikli.*

A rather rare plant. KONKAN: Vingorla, *Dalzell & Gibson.* KANARA: *Law!*; Arbail Ghát, *Talbot.*—DISTRIB. India (Behar, Chota Nagpur, W. Peninsula, Birma).

10. **BREYNIA,** Forst.

Shrubs or small trees. Leaves small, alternate, petiolate, entire, often distichous. Flowers monœcious, axillary, minute. Perianth simple. Pedicels distinct, solitary or the males fascicled, the fascicle rarely replaced by a short raceme. MALE FLOWERS: Calyx turbinate or hemispheric with a truncate limb, the margin often thickened and lobulate opposite the minute inflexed and rounded lobes. Petals 0. Disk 0. Stamens 3; filaments connate in a column; anthers slender, adnate to the whole length of the column, the cells linear, parallel, distinct. Pistillode 0. FEMALE FLOWERS: Calyx coriaceous, turbinate, campanulate or rotate; limb broadly and shortly 6-lobed, often much accrescent and disciform in fruit. Petals 0. Disk 0. Staminodes 0. Ovary 3-celled, fleshy above, globose or truncate or depressed at the apex; ovules 2 in each cell; styles 3, sessile or connate in a short column, each 2-fid or 2-lobed; or stigmas 3, simple, minute, immersed in a cavity at the top of the ovary. Fruit globose or depressed, more or less succulent, indehiscent, or with a 6-valved pericarp enclosing 3–6 imperforate indehiscent cocci. Seeds with membranous testa; albumen

fleshy; cotyledons broad; radicle long.—DISTRIB. Tropical Asia, Africa, and Pacific Islands; species about 12.

Calyx greatly enlarged in fruit	1. *B. patens.*
Calyx not or scarcely enlarged in fruit	2. *B. rhamnoides.*

1. **Breynia patens,** *Rolfe, in Journ. Bot.* N. S. v. 11 (1882) p. 359. A shrub or small tree with spreading branches; bark smooth, grey; branchlets slender, angular, glabrous. Leaves numerous, distichous, ½–1⅛ by ⅓–⅝ in., membranous, broadly elliptic, obtuse, glabrous, glaucous beneath; main nerves 3–5 pairs; petioles $\frac{1}{16}$ in. long; stipules $\frac{1}{10}$ in. long, subulate from a triangular base, persistent. Flowers appearing with the young leaves, axillary on filiform pedicels, the males in the lower, the females in the upper axils. MALE FLOWERS pale yellow, in fascicles of 1–3. Calyx turbinate or campanulate, $\frac{1}{10}$–$\frac{1}{6}$ in. long, truncate or crenate at the mouth. Anthers adnate throughout their entire length to the acute staminal-column which is produced beyond them. FEMALE FLOWERS greenish. Pedicels shorter than in the male. Calyx deeply divided into 6 rounded apiculate segments. Ovary truncate; styles 3, stout, 2-fid. Fruit depressed-globose, ½–⅔ in. in diam., faintly 3-lobed, orange-red, fleshy but dehiscent, seated on the greatly enlarged colored calyx. Seeds 3-quetrous with an orange-yellow aril; testa perforate at the hilum. Fl. B. I. v. 5, p. 329; Trim. Fl. Ceyl. v. 4, p. 33; Talb. Trees, Bomb. ed. 2, p. 303; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 933. *Melanthesa obliqua*, Wight, Icon. t. 1898. *M. turbinata*, Wight, Icon. v. 5, part 2, p. 26, t. 1897 (by error in Tab. *truncata*); Dalz. & Gibs. p. 234. *Melanthesopsis patens*, Muell. Arg. in DC. Prodr. v. 15, part 2 (1866) p. 437; Bedd. in For. Man. in Flor. Sylvat. p. cxcvi. *Phyllanthus turbinatus*, Kœn. ex Roxb. Hort. Beng. (1814) p. 104; Grah. Cat. p. 180. —Flowers: Apr.–June. VERN. *Kangli.*

KONKAN: *Law*!, *Talbot*; Malabar and Worli Hills (Bombay), *Graham*; Salsette, *Graham.* DECCAN: Khandala, *Woodrow*; Lanoli, *Kanitkar*! KANARA: *Talbot*; Yellapur, *Woodrow*!—DISTRIB. India (Tropical Himalaya, Assam, Chittagong, Birma, W. Peninsula); Ceylon.

2. **Breynia rhamnoides,** *Muell. Arg. in DC. Prodr.* v. 15, part 2 (1866) p. 440. A large glabrous shrub with many horizontal branches; bark yellowish; branchlets angular, glabrous. Leaves numerous, thin, distichous, spreading, ⅝–1½ by ⅜–1 in., elliptic, obtuse or subacute, pale beneath, base subacute or rounded; petioles $\frac{1}{16}$ in. long; stipules $\frac{1}{16}$ in. long, subulate from a triangular base, persistent. Flowers minute, the males usually in small fascicles, the females mostly solitary; pedicels filiform, variable in length. MALE FLOWERS: Calyx turbinate or subcampanulate; mouth entire or obscurely lobed. Staminal-column truncate at the apex, produced beyond the adnate anthers. FEMALE FLOWERS: Calyx cup-shaped, 6-lobed; lobes acute. Ovary exserted, oblong, truncate; styles very short. Fruit globose, scarcely reaching ¼ in. in diam., smooth, succulent, dull-red. Seeds ⅛ in. long without an aril; testa imperforate except at the very base. Fl. B. I. v. 5, p. 330; Bedd. For. Man. in Flor. Sylvat. p. cxcvi & Anal. Gen. t. 24, fig. 2 (by error in Tab. *Melanthesopsis patens*); Trim. Fl. Ceyl. v. 4,

p. 34; Talb. Trees, Bomb. ed. 2, p. 303; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 933; Watt, Dict. Econ. Prod. v. 1, p. 534. *Phyllanthus Vitis-Idæa*, Roxb. Fl. Ind. v. 3, p. 665; Grah. Cat. p. 180. *Melanthesa rhamnoides*, Blume, Bijdr. (1825) p. 591; Wight, Icon. t. 1898.—Flowers: Apr.-June.

KONKAN: *Talbot.* KANARA: *Talbot*; Devimana, *Woodrow*!—Throughout Tropical India; Ceylon, China, Malay Islands, Philippines.

11. **PHYLLANTHUS,** Linn.

Herbs, shrubs, or trees. Leaves bifarious or distichous, alternate, entire, the branchlets with their leaves often resembling pinnate leaves; stipules usually narrow or 0. Flowers small, monœcious (dioecious in *P. indicus*), axillary or on old nodes; males usually many, fascicled, subsessile or pedicellate, rarely few or solitary; females in the same or distinct axils with longer pedicels, solitary or few. Perianth simple. MALE FLOWERS: Sepals 4–6, free or very shortly connate, imbricate and more or less 2-seriate. Disk glandular (rarely 0). Stamens 3 (rarely 4 or 5), in the centre of the flower; filaments free or connate; anthers 2-celled, oblong or didymous (rarely reniform), the cells parallel or diverging; dehiscence extrorse, vertical or transverse. Pistillode 0. FEMALE FLOWERS: Sepals as in the male. Petals 0. Ovary usually 3-celled; ovules 2 in each cell; styles free or connate, usually 2-fid, with slender arms (rarely dilated). Fruit of 3 crustaceous or coriaceous (rarely bony) 2-valved cocci with or without a separable coriaceous (rarely fleshy) epicarp, sometimes a 4-celled berry or a drupe with a 3–4-celled bony endocarp. Seeds 3-gonous; testa crustaceous; hilum without a strophiole; albumen fleshy; cotyledons flat or flexuous.—DISTRIB. Species about 400, in all warm countries.

Sepals 5–6 in both sexes; stamens 5 or 3; styles 3; flowers monœcious.
- Stamens 5 in 2 series, the 3 inner filaments connate... 1. *P. reticulatus.*
- Stamens 3; filaments united in a long or short column, rarely free and recurved.
  - Anthers erect; slits vertical; connective usually produced.
    - Fruit large, fleshy, with 3 bony 2-valved cocci; disk absent in male flowers; styles united below, twice 2-fid; a tree..... 2. *P. Emblica.*
    - Fruit a capsule of 3 crustaceous 2-valved cocci; disk present in male and female flowers; styles once 2-fid, free.
      - A shrub; stipules minute, setaceous ... 3. *P. Lawii.*
      - Herbs; stipules peltate.
        - Leaves scattered, cuneate-obovate; capsules smooth ..... 4. *P. maderaspatensis.*
        - Leaves close-set, distichously imbricating, oblong or linear-oblong; capsules echinate ..... 5. *P. Urinaria.*
  - Anthers didymous or reniform, the cells subglobose; slits very short, so that when the cells are confluent the dehiscence seems transverse; fruit a capsule; styles once 2-fid, free or connate.
    - Stipules peltate ..... 6. *P. simplex.*

Stipules simple, not peltate.	
Glabrous annuals.	
Styles minute, 2-lobed; disk-glands of males minute; seeds with regular parallel ribs	7. *P. Niruri.*
Styles reflexed with recurved arms; disk-glands of males stellately lobed; seeds with irregular ribs	8. *P. debilis.*
Branches and leaves hispidly hairy	9. *P. scabrifolius.*
Sepals 4 in both sexes; stamens 4; styles 3; flowers diœcious; a tree	10. *P. indicus.*

1. **Phyllanthus reticulatus,** *Poir. Encyc. Méthod.* v. 5 (1804) p. 298. A large glabrous or pubescent straggling or climbing shrub (in the forests along the Indus in Sind climbing over the largest trees [*Brandis*]); branches smooth or lenticellate. Leaves $\frac{1}{2}$–$1\frac{1}{4}$ by $\frac{1}{3}$–$\frac{3}{4}$ in., variable, oblong or elliptic, sometimes almost rotundate, obtuse or acute, thin, glabrous or nearly so, pale beneath, base rounded, acute or sub cordate; main nerves few, slender; petioles $\frac{1}{16}$–$\frac{1}{8}$ in. long, slender, stipules $\frac{1}{16}$ in. long, ovate, acute, sometimes bristle-pointed. Flowers axillary, the males in fascicles of 2–6, the females solitary; pedicels $\frac{1}{16}$–$\frac{1}{4}$ in. long, slender. Calyx glabrous, reaching $\frac{1}{10}$ in. long; segments oblong, very obtuse, alternating with the glands of the disk. MALE FLOWERS: Stamens 5, the 3 inner connate into a column, the 2 outer free, shorter. FEMALE FLOWERS: Ovary 5–10-celled; ovules 2 in each cell, superposed; styles 3, minute, 2-lobed. Fruit a purple fleshy berry $\frac{1}{6}$ in. in diam., globose, smooth and shining. Seeds 8–16 (usually 10), irregularly 3-gonous, finely granulate. Fl. B. I. v. 5, p. 288; Trim. Fl. Ceyl. v. 4, p. 19; Talb. Trees, Bomb. ed. 2, p. 300; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369; Prain, Beng. Pl. p. 934; Watt, Dict. Econ. Prod. v. 6, part 1, p. 223. *Phyllanthus multiflorus,* Willd. Sp. Pl. v. 4 (1805) p. 581; Grah. Cat. p. 180. *Anisonema multiflora,* Wight, Icon. t. 1899; Dalz. & Gibs. p. 234.—Flowers throughout the year. VERN. *Pávan*; *Datvan.*

Throughout the Presidency, often in hedges. KONKAN: *Law*!, *Stocks*!, *Graham.* S. M. COUNTRY: Dharwar, *Cooke*! KANARA: Karwar, *Talbot*, 12! GUJARAT: Dakor, *Kanitkar*!—DISTRIB. Throughout Tropical India; Ceylon, Tropical Africa, China, Malay Islands.

2. **Phyllanthus Emblica,** *Linn. Sp. Pl.* (1753) p. 982. A deciduous small or middle-sized tree with crooked trunk and spreading branches; bark greenish-grey, peeling off in conchoidal flakes; branchlets glabrous or finely pubescent, 4–8 in. long, often deciduous. Leaves subsessile, $\frac{3}{8}$–$\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., closely set along the branchlets, distichous, light-green, glabrous, narrowly linear, obtuse, imbricate when young, having the appearance of pinnate leaves; stipules ovate, finely acute. Flowers greenish-yellow, in axillary fascicles on the leaf-bearing branchlets, often on the naked portion below the leaves, with fimbriate bracts at the base. MALE FLOWERS numerous, on short slender pedicels. Sepals 6, oblong, obtuse, $\frac{1}{20}$ in. long. Disk 0. Anthers 3 on a short central column. FEMALE FLOWERS few, subsessile. Sepals as in the male. Disk a lacerate cup. Ovary 3-celled; styles connate at the base, irregularly twice 2-fid with acute lobes. Fruit $\frac{1}{2}$–$\frac{5}{8}$ in. in diam., fleshy, globose, with 6 obscure vertical furrows, pale yellow, of three 2-seeded crustaceous cocci. Seeds 6, 3-gonous. Fl. B. I. v. 5, p. 289; Grah. Cat. p. 180; Bedd. Flor. Sylvat. t. 258; Trim. Fl. Ceyl. v. 4, p. 19;

Talb. Trees, Bomb. ed. 2, p. 300; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 934; Watt, Dict. Econ. Prod. v. 6, part 1, p. 217. *Emblica officinalis*, Gærtn. Fruct. v. 2 (1791) p. 122, t. 108; Wight, Icon. t. 1896; Dalz. & Gibs. p. 235.—Flowers: Mar.-May. VERN. *Avlá*; *Amlá*; *Nelli*.

Throughout the Presidency in deciduous forests, often planted. KONKAN: *Dalzell & Gibson*; Matheran, *Cooke*!; Western Ghâts, *Woodrow*. DECCAN: *Graham*, *Dalzell & Gibson*.—DISTRIB. Throughout Tropical India, wild or planted; Ceylon, China, Malay Islands.

The fruit known as the *Emblic Myrobalan* is used as a medicine, and for dyeing and tanning. It is also made into a sweetmeat with sugar, and sometimes used as a pickle. The wood is valuable for various purposes. See Watt, Dict. Econ. Prod. l. c.

3. **Phyllanthus Lawii,** *Grah. Cat. Pl. Bomb.* (1839) p. 181. A glabrous shrub usually growing along river-banks; branches grooved. Leaves $\frac{1}{8}$–$\frac{1}{5}$ by $\frac{1}{12}$–$\frac{1}{10}$ in., distichous, overlapping, linear-oblong, rounded at the apex, often apiculate, base rounded or subcordate; nerves obscure; petioles scarcely $\frac{1}{50}$ in. long; stipules $\frac{1}{20}$ in. long, lanceolate-subulate. Flowers axillary, the males solitary or few together, the female solitary. Sepals of male and female flowers 6, linear-oblong, obtuse, those of the female flowers $\frac{1}{10}$ in. long. Stamens 3, the filaments united in a short column; anthers erect with vertical slits. Styles 3, distinct, $\frac{1}{20}$ in. long, shortly and bluntly 2-fid, the short lobes usually recurved. Capsules $\frac{1}{6}$ in. in diam., on a pedicel about $\frac{1}{30}$ in. long, globose, slightly depressed, glabrous. Seeds $\frac{1}{10}$ in. long, 3-gonous, rounded on the back, glabrous. Fl. B. I. v. 5, p. 290; Talb. Trees, Bomb. ed. 2, p. 300; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 934. *Phyllanthus polyphyllus*, Dalz. & Gibs. p. 234 (*not* of Willd.). —Flowers: Sept.-Oct.

Often forming dense thickets along the banks of rivers towards the Ghâts. KONKAN: *Stocks*!, *Law*!, *Dalzell*!, *Lambert*! S. M. COUNTRY: Nalatwar near Kaladghi, *Graham*; Castlerock, *Cooke*! KANARA: banks of the Gatpraba River, *Graham*; common along the Kála naddi, forming dense thickets like tamarisk near the water's edge, *Talbot*.—DISTRIB. India (Behar, Central Provinces, W. Peninsula).

4. **Phyllanthus maderaspatensis,** *Linn. Sp. Pl.* (1753) p. 982. Annual but sometimes woody at the base, very variable in habit; stems glabrous, 1–3 ft. long, erect, ascending or decumbent. Leaves scattered, variable, $\frac{1}{4}$–$1\frac{1}{4}$ by $\frac{1}{8}$–$\frac{5}{8}$ in., glabrous, obovate-cuneate, rounded, truncate or somewhat obcordate at the apex, mucronate, much tapering into a very short petiole, glaucous and with a few lateral nerves conspicuous beneath; stipules peltate, lanceolate, very acute. Flowers axillary, the male flowers minute in small clusters, subsessile, the female larger, solitary, shortly pedicellate. Sepals 6, obovate, obtuse, green with white margins. Stamens 3; filaments connate. Styles 3, distinct, very small, 2-lobed. Capsules $\frac{1}{8}$ in. in diam., depressed-globose, glabrous, 3-lobed. Seeds $\frac{1}{16}$ in. long, 3-gonous, rounded on the back, muriculate in fine lines (beautifully marked like basket-work, *Dalzell & Gibson*), brown. Fl. B. I. v. 5, p. 292; Grah. Cat. p. 180; Dalz. & Gibs. p. 233; Wight, Icon. t. 1895, fig. 3; Trim. Fl. Ceyl. v. 4, p. 20; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 934; Watt, Dict. Econ. Prod. v. 6, part 1, p. 221.—Flowers: July-Aug. VERN. *Kanocha*.

Dalzell without locality in Herb. Kew.! *Stocks* without locality in Herb. Kew.! DECCAN: *Cooke*! S. M. COUNTRY: Badami, *Woodrow*.—DISTRIB. India (drier parts); Ceylon, Tropical Africa, Arabia, Java, China, Australia.

5. **Phyllanthus Urinaria,** *Linn. Sp. Pl.* (1753) p. 982. Annual, 1–2 ft. high, glabrous or nearly so. Stems erect, slightly branched; leaf-bearing branchlets short, flattened or slightly winged. Leaves closely placed, distichously imbricate, sessile or nearly so, $\frac{1}{4}$–$\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{4}$ in., oblong or linear-oblong, rounded and apiculate at the apex, pale beneath, glabrous, base rounded, usually oblique; stipules peltate, very acute, from a broad base. Flowers minute, axillary, subsessile, solitary, yellowish. Sepals $\frac{1}{30}$–$\frac{1}{25}$ in. long, oblong, rounded, not enlarged in fruit. Capsules $\frac{1}{8}$ in. in diam., globose, scarcely lobed, echinate. Seeds $\frac{1}{16}$ in. long, 3-gonous, rounded on the back, transversely furrowed. Fl. B. I. v. 5, p. 293; Grah. Cat. p. 180; Trim. Fl. Ceyl. v. 4, p. 21; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 934; Watt, Dict. Econ. Prod. v. 6, part 1, p. 224. *Phyllanthus leprocarpus*, Wight, Icon. t. 1895, fig. 4.—Flowers: Aug.

Konkan: Kalyan, *Bhiva*!; Matheran, *Bhiva*!, *Woodrow*; Bombay, *Graham*. Deccan; Khandala, *Woodrow*.—Distrib. Throughout India; Ceylon, Tropics generally.

6. **Phyllanthus simplex,** *Retz. Obs. Bot.* fasc. 5 (1789) p. 29. A glabrous perennial herb or an undershrub, usually with a long tap-root; branches compressed. Leaves distichous, numerous, $\frac{1}{2}$–$\frac{3}{4}$ by $\frac{1}{8}$–$\frac{1}{4}$ in., subsessile, closely placed and often overlapping, linear-oblong, obtuse, apiculate; stipules peltate, sagittate, brown, scarious. Flowers usually solitary, on slender axillary pedicels, the female larger than the male. Sepals about $\frac{1}{30}$ in. long, oblong, obtuse, those of the female flowers slightly enlarged in fruit. Stamens 3, distinct; anthers didymous, the slits very short, so that when the cells are confluent the dehiscence seems transverse. Styles short, 2-fid. Capsules $\frac{1}{10}$ in. in diam., globose, slightly 3-lobed, crustaceous, usually slightly rough with minute prominences but not echinate. Seeds $\frac{1}{20}$–$\frac{1}{16}$ in. long, 3-gonous, rounded on the back, covered with minute tubercles in irregular lines, very dark brown. Fl. B. I. v. 5, p. 295; Dalz. & Gibs. p. 234; Trim. Fl. Ceyl. v. 4, p. 22; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 935; Watt, Dict. Econ. Prod. v. 6, part 1, p. 223.—Flowers: Aug.–Nov.

Konkan: Worli (Bombay), *Stocks*!; Kalyan, *Bhiva*! S. M. Country: Badami, *Cooke*!; Dharwar, *Woodrow*.—Distrib. Throughout India; Ceylon, Malay Islands, China, Pacific Islands.

7. **Phyllanthus Niruri,** *Linn. Sp. Pl.* (1753) p. 981. Annual herb 1–2 ft. high, quite glabrous; stem often branched at the base, angular; leaf-bearing branchlets slender, spreading. Leaves numerous, subsessile, distichous, often imbricating, $\frac{1}{4}$–$\frac{1}{2}$ by $\frac{1}{8}$–$\frac{1}{4}$ in., elliptic-oblong, obtuse (rarely subacute), glaucous beneath, base rounded; petioles very short; stipules lanceolate-subulate, very acute. Flowers yellowish, very numerous, axillary, the males 1–3, the females solitary. Sepals of male flowers $\frac{1}{40}$ in. long, rounded, those of the female $\frac{1}{20}$ in. long, oblong, subacute, with white margins, not enlarged in fruit. Stamens 3; anthers sessile on a short column. Styles minute, free, 2-lobed. Disk of male of minute glands; of female annular, lobed. Capsules $\frac{1}{10}$ in. in diam., depressed-globose, smooth, scarcely lobed. Seeds $\frac{1}{16}$ in. long, 3-gonous, rounded and with longitudinal regular parallel ribs on the back. Fl. B. I. v. 5, p. 298; Grah. Cat. p. 180; Dalz. & Gibs. p. 234; Wight, Icon. t. 1894; Trim. Fl. Ceyl. v. 4, p. 23; Woodr. in Journ.

Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 935; Watt, Dict. Econ. Prod. v. 6, part 1, p. 222.—Flowers: July–Aug. VERN. *Bhuiávali.*

A common weed in gardens and cultivated land, *Graham, Dalzell.* KONKAN: *Stocks!, Law!*; Worli (Bombay), *Stocks!* DECCAN: *Woodrow*; Poona, *Cooke!*—DISTRIB. Throughout India; Ceylon, Tropics generally except Australia. The plant is much employed in native medicine.

8. **Phyllanthus debilis,** *Herb. Ham. ex Wall. Cat.* (1828) sub n. 7892. A glabrous annual 1–3 ft. high; stem terete, naked below, branched above. Leaves $\frac{1}{4}$–$\frac{3}{4}$ by $\frac{1}{6}$–$\frac{3}{8}$ in., thinly membranous, elliptic or obovate, obtuse or acute, glaucous beneath, base usually acute; main nerves obscure; petioles $\frac{1}{20}$–$\frac{1}{12}$ in. long; stipules lanceolate-subulate, scarious. Flowers axillary, on short pedicels, the pedicels of the females longer than those of the males. Sepals of female flowers $\frac{1}{16}$–$\frac{1}{12}$ in. long, with broad thin scarious margins, obovate-oblong, enlarged in fruit; sepals of the male much smaller. Disk-glands of male flowers stellately lobed. Filaments short, free. Styles $\frac{1}{50}$ in. long, free, 2-fid, the arms recurved. Capsules $\frac{1}{10}$ in. in diam., depressed-globose. Seeds $\frac{1}{20}$–$\frac{1}{16}$ in. long, 3-gonous, rounded and irregularly ribbed on the back. Fl. B. I. v. 5, p. 299; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 935.

SIND: *Bhola Puran!, Woodrow.*—DISTRIB. India (N.W. Provinces, Sikkim, Behar, Assam, W. Peninsula); Tropical Africa.

9. **Phyllanthus scabrifolius,** *Hook. f. Fl. B. I.* v. 5 (1887) p. 299. An annual leafy herb 6–10 in. high; stem erect, branched from the base and upwards; branches angular, clothed with short stiff white hairs on the angles. Leaves $\frac{3}{8}$–$\frac{1}{2}$ by $\frac{1}{4}$ in., subsessile, broadly elliptic or obovate, rounded at the apex, pale when dry, scaberulous beneath and with undulate margins; main nerves 4–5 pairs, distinct on both surfaces; petioles minute; stipules lanceolate-subulate, membranous. Flowers very shortly pedicellate. Sepals oblong or obovate-oblong, with white scarious margins, those of the female flowers $\frac{1}{10}$ in. long, of the males shorter. Filaments short, united to the middle, the apex recurved; anther-cells at length confluent. Styles 3, distinct, $\frac{1}{30}$ in. long, 2-fid, the lobes recurved. Disk of male of rounded glands, of the female a low crenate cup. Capsules $\frac{1}{8}$ in. in diam., depressed-globose, smooth or slightly granulate. Seeds $\frac{1}{20}$ in. long, broad, 3-gonous, rounded, and with 7–9 parallel ribs on the back and concentric ribs on the faces. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370.

KONKAN: *Stocks!* DECCAN: Dongergaon near Ahmednagar, *Woodrow.*

There is but one sheet in Herb. Kew. marked Konkan, *Stocks.* Woodrow, however, reports the plant from Ahmednagar in the Deccan.—DISTRIB. India (W. Peninsula), apparently endemic.

10. **Phyllanthus indicus,** *Muell. Arg. in Linnæa,* v. 32 (1863) p. 52. A much-branched deciduous glabrous tree 30–40 ft. high; bark white, scaly, smooth, exfoliating in plates. Leaves membranous, $2\frac{1}{2}$–6 by $1\frac{1}{2}$–3 in., distichous, elliptic or elliptic-lanceolate, obtuse, acute or acuminate, often apiculate, glabrous, glaucous beneath, base acute; main nerves 6–10 pairs; petioles $\frac{1}{4}$ in. long; stipules lanceolate, deciduous. Flowers dicœcious, pedicellate, pale-green, the males in fascicles

in the axils and on the branches on capillary pedicels $\frac{1}{8}$–$\frac{1}{4}$ in long, the females larger, in umbellate clusters on stout pedicels $\frac{1}{2}$–1 in. long. Sepals 4 (rarely 5), oblong, obtuse, the 2 outer larger. MALE FLOWERS: Stamens 4; filaments free; anthers oblong, adnate, extrorse, dehiscing longitudinally. Disk annular, fleshy, large. Rudimentary ovary 0. FEMALE FLOWERS: Stamens 0. Disk small, narrow. Ovary 3-celled; ovules 2 in each cell; styles very short, deeply 2-fid, the lobes recurved. Capsules $\frac{3}{8}$ in. in diam., globose, usually reticulately rugose; cocci 2-valved, 2-seeded. Seeds irregularly 3-gonous, blue, surrounded by an aril. Fl. B. I. v. 5, p. 305; Bedd. For. Man. in Flor. Sylvat. p. cxci; Trim. Fl. Ceyl. v. 4, p. 27; Talb. Trees, Bomb. ed. 2, p. 300; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Watt, Dict. Econ. Prod. v. 6, part 1, p. 221. *Prosorus indica*, Dalz. in Kew Journ. Bot. v. 4 (1852) p. 346; Dalz. & Gibs. p. 236.—Flowers: Apr.–May. VERN. *Pán-nána.*

KONKAN: *Dalzell*!, *Law*! S. M. COUNTRY: Párva Ghát, *Ritchie*, 1343! KANARA: *Law*!; N. Kanara Ghâts in deciduous and evergreen forests, *Talbot*; Puttagudda near Yellapur, *Talbot*, 1173!—DISTRIB. India (W. Peninsula); Ceylon.

Phyllanthus distichus, Muell. Arg. in DC. Prodr. v. 15, part 2 (1866) p. 413. A glabrous robust deciduous tree, a native of the Malay Islands and Madagascar, with pinnately distichous obliquely ovate acute leaves 2–3 in. long, small reddish flowers densely clustered, and a globose fleshy acid ribbed fruit of the size of a large gooseberry, is sometimes grown in gardens. Fl. B. I. v. 5, p. 304; Talb. Trees, Bomb. ed. 2, p. 300; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 935; Watt, Dict. Econ. Prod. v. 6, part 1, p. 217. *Cicca disticha*, Linn. Mant. p. 124; Grah. Cat. p. 180; Dalz. & Gibs. Suppl. p. 78. The fruit is known as the *Country Gooseberry*, and is used in tarts and for pickles.—VERN. *Harpharori.*

DOUBTFUL SPECIES.

PHYLLANTHUS RHEEDEI, Wight, Icon. v. 5 (1852) part 2, p. 25, t. 1895, fig. 1. This plant is given by Woodrow in his list as occurring in Sind. I have seen no specimens from that Province, and it scarcely seems likely that it should occur there. The specimens in the Kew Herbarium are from the Nilghiri Mountains, alt. 6000 ft., and from the montane zone in Ceylon, alt. 4–7000 ft. Fl. B. I. v. 5, p. 293; Trim. Fl. Ceyl. v. 4, p. 21; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370.—DISTRIB. India (Nilghiri Hills); Ceylon.

12. **PUTRANJIVA,** Wall.

Trees. Leaves alternate, evergreen, entire or serrulate, penninerved and reticulately veined. Flowers monœcious or diœcious, axillary, pedicellate, the males clustered, the females subsolitary. Perianth simple. MALE FLOWERS: Calyx 3–6-lobed; lobes imbricate. Petals 0. Disk 0. Stamens 2–4 in the centre of the flower; filaments free or more or less connate; anthers erect, the cells parallel. Pistillode 0. FEMALE FLOWERS: Calyx as in the male. Petals 0. Disk 0. Ovary ovoid, 2–3-celled; ovules 2 in each cell; styles short, spreading, dilated, with broad fleshy arms. Fruit an ovoid or globose drupe; endocarp hard, 1-celled. Seed solitary, ovoid; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species 2, Indian.

1. **Putranjiva Roxburghii,** *Wall. Tent. Fl. Nep.* (1826) p. 61. An evergreen tree 30–40 ft. high with pendent branches, nearly glabrous except the young shoots; bark corky, pale. Leaves coriaceous, dark-green, shining, 2½–4 by ⅞–1½ in., elliptic-oblong, acute, obtuse or shortly acuminate, distantly serrulate; main nerves numerous, slender, with reticulate venation between; petioles ¼ in. long; stipules small, triangular, acute, soon falling. Flowers dicœcious. MALE FLOWERS very shortly pedicellate, crowded in rounded axillary clusters on the main or on short axillary branches. Sepals $\frac{1}{10}$ in. long, oblong, obtuse, ciliolate. Filaments $\frac{1}{16}$–$\frac{1}{12}$ in. long, more or less connate at the base; anthers globose, $\frac{1}{16}$–$\frac{1}{12}$ in. in diam. FEMALE FLOWERS 1–3 in an axil; pedicels ⅓–½ in. long. Sepals broadly elliptic, obtuse, concave, ciliolate, $\frac{1}{10}$ in. long. Ovary finely silky, 3-celled; styles 3, recurved, dilated into broad fleshy crescent-shaped stigmas. Drupe ½–¾ in. long, ellipsoid, rounded or pointed at the apex, narrowed at the base, white-tomentose, with pedicels ½–1 in. long; stone pointed, rugose, very hard. Fl. B. I. v. 5, p. 336; Dalz. & Gibs. p. 236; Wight, Icon. t. 1876; Bedd. Flor. Sylvat. t. 275; Trim. Fl. Ceyl. v. 4, p. 35; Talb. Trees, Bomb. ed. 2, p. 305; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Prain, Beng. Pl. p. 936; Watt, Dict. Econ. Prod. v. 6, part 1, p. 372.—Flowers: Mar.–May. VERN. *Putranjiva.*

KONKAN: *Talbot*; Kanheri and Alibág jungles, *Dalzell & Gibson.* DECCAN: Poona, *Woodrow* (planted); Khandala, *Dalzell & Gibson.* S. M. COUNTRY: Belgaum, *Dalzell & Gibson.* KANARA: evergreen forests of N. Kanara, nowhere common, *Talbot*; Bunwasi, *Talbot*!—DISTRIB. Throughout Tropical India wild and cultivated; Ceylon.

The stones of the fruit are made into necklaces and put round the necks of children to preserve them from evil; hence the native name, which means *the life of the child.* The wood is used for turning. See Watt, Dict. Econ. Prod. l. c.

13. **HEMICYCLIA,** Wight & Arn.

Trees or shrubs. Leaves evergreen, alternate, petiolate, quite entire, usually very unequal-sided at the base. Flowers small, pedicellate, dicœcious, apetalous. MALE FLOWERS: Sepals 4–5, imbricate, the inner usually larger and subpetaloid. Stamens 4–23, inserted round an orbicular disk; filaments free; anthers erect, the cells parallel. Pistillode 0. FEMALE FLOWERS: Calyx as in the male. Disk flat, annular. Ovary obliquely ovoid, 1 (rarely 2)-celled; ovules 2 in each cell; stigma 1 (rarely 2), sessile or on a short style, broadly reniform or semiorbicular, flat or recurved, entire or emarginate. Fruit drupaceous, globose or ovoid, indehiscent; endocarp hard. Seed usually solitary, oblong, grooved on one face, arillate; albumen fleshy; embryo straight; cotyledons broad, flat.—DISTRIB. India, Malay Archipelago, Australia; species 9.

Fruit globose, small, ¼–⅓ in. in diam.	1. *H. sepiaria.*
Fruit obovoid, ¾ in. long	2. *H. venusta.*

1. **Hemicyclia sepiaria,** *Wight & Arn. in Edinb. New Phil. Journ.* v. 14 (1833) p. 297. A rigid much-branched shrub 6–9 ft. high; young shoots puberulous. Leaves very coriaceous, 1½–3½ by ¾–1¾ in., elliptic or elliptic-oblong, obtuse or retuse, glabrous, shining above, base rounded or cordate. Flowers pubescent or villous, pedicellate. Sepals 4.

MALE FLOWERS: Pedicels $\frac{1}{8}$–$\frac{1}{4}$ in. long, pubescent. Sepals $\frac{1}{10}$ in. long and as broad as long, ovate-oblong or suborbicular, concave, rounded at the apex, ciliolate. Stamens 8–10 on a cupular disk; filaments $\frac{1}{20}$ in. long, slender; anthers oblong, $\frac{1}{20}$ in. long. FEMALE FLOWERS: Pedicels shorter than in the male, sometimes almost 0. Calyx as in the male. Ovary somewhat truncate at the apex, 1–2-celled; style 0 or almost 0; stigma orbicular or semicircular with slightly crenulate margins, like a small mushroom or half a mushroom on the top of the ovary. Fruit globose, $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., edible, crimson when ripe, 1-seeded; endocarp bony. Fl. B. I. v. 5, p. 337; Dalz. & Gibs. p. 229; Wight, Icon. t. 1872; Bedd. For. Man. in Flor. Sylvat. p. cxcviii; Trim. Fl. Ceyl. v. 4, p. 36; Talb. Trees, Bomb. ed. 2, p. 306; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370; Watt, Dict. Econ. Prod. v. 4, p. 218.

KANARA: *Talbot, Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

2. **Hemicyclia venusta,** *Thwaites, in Kew Journ. Bot.* v. 7 (1855) p. 272. A middle-sized evergreen tree with smooth bark; branchlets slender, drooping, glabrous or nearly so. Leaves thickly coriaceous, $2\frac{3}{4}$–$5\frac{1}{2}$ by 1–2 in., elliptic or oblong, obtuse or acuminate, glabrous, reticulately veined, base usually acute, sometimes unequal-sided; petioles $\frac{1}{6}$–$\frac{1}{4}$ in. long. Flowers axillary, the males in fascicles, the females usually solitary. MALE FLOWERS: Pedicels $\frac{1}{4}$ in. long. Sepals 4, broadly ovate, obtuse, $\frac{1}{8}$ by $\frac{1}{8}$ in., pubescent outside. Stamens 5–8, surrounding a fleshy crenulate disk; filaments $\frac{1}{10}$ in. long; anthers $\frac{1}{16}$ in. long, oblong. FEMALE FLOWERS: Pedicels $\frac{1}{4}$ in. long. Sepals as in the male. Ovary seated on a fleshy nearly flat disk; style 0; stigma $\frac{1}{10}$ in. in diam., orbicular, sessile like a mushroom on the ovary. Fruit $\frac{3}{4}$ by $\frac{1}{2}$ in., obovoid, sometimes gibbous. Fl. B. I. v. 5, p. 339; Dalz. & Gibs. p. 229; Bedd. For. Man. in Flor. Sylvat. p. cxcviii; Talb. Trees, Bomb. ed. 2, p. 306. *Astylis venusta*, Wight, Icon. v. 6 (1853) p. 13, t. 1992.—Flowers: Nov.

Western India, *Gibson*!; *Dalzell* without locality in Herb. Kew.! KONKAN: *Stocks*!, *Law*! S. M. COUNTRY: hills in the Dharwar zilla, *Dalzell & Gibson*. KANARA: Southern Ghâts of N. Kanara in evergreen forests, *Talbot*.—DISTRIB. India (W. Peninsula).

14. CYCLOSTEMON, Blume.

Trees. Leaves coriaceous, alternate, entire or crenulate, base often unequal-sided. Flowers dicœcious, axillary, clustered. Perianth simple. MALE FLOWERS: Sepals 4–6, broad, imbricate. Buds globose. Petals 0. Disk globose or depressed. Stamens many or few, inserted round the disk; filaments short, free; anthers erect, the cells parallel. Pistillode 0 or minute. FEMALE FLOWERS: Sepals as in the male. Petals 0. Disk annular or 0. Ovary 2–4-celled; ovules 2 in each cell; style elongate or 0; stigmas dilated, fleshy, or connate into a peltate disk. Fruit subglobose or ovoid, indehiscent. Seed solitary in each cell; albumen fleshy; cotyledons broad, flat.—DISTRIB. Tropical India, Malaya, Africa; species about 18.

1. **Cyclostemon confertiflorus,** *Hook. f. Fl. B. I.* v. 5 (1887) p. 341. A large tree; bark grey, smooth. Leaves coriaceous, 4–8 by $1\frac{1}{2}$–3 in., oblong or elliptic-oblong, obtusely acuminate, glabrous, with

undulate margins, base usually acute, often unequal-sided; main nerves 5–8 pairs, slender, with reticulate venation between; petioles ¼–⅓ in. long, stout. MALE FLOWERS in clusters in the axils or on the old wood. Pedicels 0–⅕ in. long. Sepals 5, orbicular, ⅙–⅕ in. in diam., coriaceous, glabrous, veined, concave. Disk funnel-shaped, glabrous, radiately ribbed inside and with a membranous lobed border. Stamens about 20, outside the disk; filaments reaching ⅛ in. long, stout; anthers ⅒ in. long, oblong. FEMALE FLOWERS: Calyx, ovary, and style not seen, the specimens in Herb. Kew. being males. Fruit according to *Talbot* (Trees, Bomb. ed. 2, p. 306) yellow, smooth, size of a small orange, flattened, 2-seeded. Seeds plano-convex, ¾ in. long, rough. Talb. Trees, Bomb. ed. 2, p. 306; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370.—Flowers: Dec. VERN. *Augai-mara.*

Rare. KANARA: evergreen forests at Katgal, *Talbot*, 277!—DISTRIB. India (N. Kanara).

15. **ANTIDESMA,** Linn.

Trees or shrubs. Leaves alternate, entire; stipules narrow. Flowers dicœcious, small or minute, in slender axillary or terminal simple or branched spikes or racemes. Perianth simple. MALE FLOWERS: Calyx 3–5 (rarely 6–8)-lobed or -partite. Petals 0. Disk entire or lobed. Stamens 2–5 (rarely more), inserted (often irregularly) on or around the disk; filaments inflexed in bud; anthers lunate or didymous, the cells globose, approximate or distant; connective thickened. Pistillode minute, clavate or globose (rarely 2-fid), glabrous or hairy, sometimes obsolete. FEMALE FLOWERS: Calyx as in the male. Disk usually annular or pulvinate. Ovary 1-celled; ovules 2, pendulous; stigmas 2–4, usually short, 2-fid or 2-partite. Fruit a small drupe, more or less compressed, crowned by the sublateral or terminal stigmas. Seed small; albumen fleshy; cotyledons broad, flat.—DISTRIB. Tropical Asia, Africa, Australia, Polynesia; species 60–70.

Leaves very obtuse; ovary pubescent or tomentose; calyx 5–7-partite; stameus 4–7	1. *A. Ghæsembilla.*
Leaves acute or acuminate; ovary glabrous; calyx cupular, 4-lobed.	
Male flowers sessile; stamens 3	2. *A. Bunius.*
Male flowers pedicellate.	
Stamens 2	3. *A. diandrum.*
Stamens 3–4	4. *A. Menasu.*

1. **Antidesma Ghæsembilla,** *Gærtn. Fruct.* v. 1 (1788) p. 189, t. 39. A small deciduous tree; bark grey; branchlets pubescent or fulvous-tomentose. Leaves 2–4 by 1¼–2½ in., broadly elliptic or orbicular-oblong, rounded at the apex, sometimes emarginate, glabrous or nearly so above, pubescent or tomentose beneath, base rounded; main nerves 5–7 pairs; petioles ¼–½ in. long, pubescent; stipules ⅛ in. long, lanceolate, acute. Flowers sessile, in slender paniculate spikes. MALE FLOWERS: Calyx 5–7-partite, densely fulvous-hairy, ⅒ in. across when spread out flat. Stamens 4–7; filaments ⅙ in. long; anthers somewhat horseshoe-shaped. Disk 5-partite, pubescent. FEMALE FLOWERS: Calyx as in the male. Ovary densely pubescent; stigmas minute, recurved. Fruit subglobose when fresh, ⅕ in. in diam., reddish-purple, edible. Fl. B. I. v. 5, p. 357; Bedd. For. Man. in Flor. Sylvat. p. cc;

Trim. Fl. Ceyl. v. 4, p. 43; Talb. Trees, Bomb. ed. 2, p. 308; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Prain, Beng. Pl. p. 938; Watt, Dict. Econ. Prod. v. 1, p. 270. *Antidesma paniculata*, Roxb. Fl. Ind. v. 3 (1832) p. 770; Wight, Icon. t. 820; Grah. Cat. p. 186; Dalz. & Gibs. p. 237. *A. pubescens*, Roxb. Cor. Pl. v. 2 (1798) p. 35, t. 167; Grah. Cat. p. 186; Dalz. & Gibs. p. 237.—Flowers: May–July. VERN. *Jondhra*.

KONKAN: *Law*!; S. Konkan, *Graham*; hills near Vingorla, *Dalzell & Gibson*. S. M. COUNTRY: Londa, *Woodrow*. KANARA: *Woodrow*!; forests of N. Kanara, *Talbot*!—DISTRIB. India (Oudh forests, Assam, Bengal, W. Peninsula); Ceylon, Malay Islands, China.

2. **Antidesma Bunius,** *Spreng. Syst. Veg.* v. 1 (1825) p. 826. A small evergreen tree; bark greyish-brown; young shoots hairy. Leaves variable, 3–7 by $1\frac{1}{4}$–$2\frac{1}{2}$ in., elongate-elliptic or elliptic-lanceolate or oblanceolate, acuminate, glabrous and shining above, base tapering; main nerves 10–12 pairs, arching; petioles $\frac{1}{8}$ in. long or less, stout; stipules lanceolate-subulate, hairy, quickly falling. Flowers reddish, numerous, in pubescent spikes, the spikes of the female simple, of the male often compound. MALE FLOWERS sessile. Calyx cupular, shortly 4-lobed. Disk lobed, glabrous. Stamens 3, exserted. Pistillode short, truncate. FEMALE FLOWERS on short pedicels $\frac{1}{6}$–$\frac{1}{4}$ in. long. Calyx shortly tubular, truncate. Disk cupular. Ovary glabrous; stigmas 3, large, short, dilated, spreading. Fruit $\frac{1}{3}$ in. in diam., globose-ovoid, stalked, smooth, red, turning black. Fl. B. I. v. 5, p. 358; Wight, Icon. t. 819; Bedd. For. Man. in Flor. Sylvat. p. cc, t. 24, fig. 3; Trim. Fl. Ceyl. v. 4, p. 43; Talb. Trees, Bomb. ed. 2, p. 308; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Prain, Beng. Pl. p. 938; Watt, Dict. Econ. Prod. v. 1, p. 269. *Antidesma Alexiteria*, Grah. Cat. p. 186 (*not* of Linn.).—Flowers: May-June. VERN. *A'mati*.

KONKAN: *Talbot*. DECCAN: Khandala Ghát, rare, *Graham, Talbot*. KANARA: N. Kanara in moist forests, *Talbot*.—DISTRIB. India (Nipal, Assam, Birma, Chota Nagpur, W. Peninsula); Ceylon, China.

3. **Antidesma diandrum,** *Roth, Nov. Pl. Sp.* (1821) p. 369. A large shrub or small tree, the young parts usually glabrous. Leaves thin, 2–5 by 1–2 in., lanceolate, or elliptic-lanceolate, or obovate, acute or acuminate, glabrous above, glabrous or slightly pubescent beneath, base acute; petioles $\frac{1}{8}$ in. long; stipules $\frac{1}{4}$ in. long, linear, acute. Flowers in long slender glabrous or pubescent racemes, both sexes pedicellate; bracts beneath the pedicels ovate, $\frac{1}{25}$ in. long. MALE FLOWERS: Pedicels $\frac{1}{20}$ in. long. Calyx cup-shaped, $\frac{1}{20}$ in. long, with 4 short obtuse lobes. Stamens usually 2; filaments $\frac{1}{16}$ in. long, at the base of a glabrous disk. FEMALE FLOWERS: Pedicels stouter than in the male. Calyx $\frac{1}{16}$ in. long; lobes rather deeper than in the male. Ovary glabrous; styles 2, short, terminal, one of them usually 2-fid. Fruit $\frac{1}{6}$ in. in diam., purplish-red, edible. Fl. B. I. v. 5, p. 361; Dalz. & Gibs. p. 237; Bedd. For. Man. in Flor. Sylvat. p. cci; Trim. Fl. Ceyl. v. 4, p. 44; Talb. Trees, Bomb. ed. 2, p. 308; Prain, Beng. Pl. p. 938; Watt, Dict. Econ. Prod. v. 1, p. 270. *Antidesma lanceolarium*, Wall. Cat. 7284; Wight, Icon. t. 766.—Flowers: May–July.

KONKAN: *Law*!; Vingorla, *Dalzell & Gibson*. KANARA: N. Kanara in moist forests from the coast inland, *Talbot*; Yellapur, *Talbot*!—DISTRIB. India (Subhimalayan

tract, Behar, Chota Nagpur, Central Provinces, Bengal, Birma, W. Peninsula); Ceylon.

The fruit is eaten, as also the leaves, which have an acid taste like sorrel. The wood is pinkish-grey, hard and close-grained (*Talbot*).

4. **Antidesma Menasu,** *Miq. ex Tul. in Ann. Sc. Nat.* sér. 3, v. 15 (1851) p. 215. A small or middle-sized tree; branchlets, stipules, petioles, and inflorescence velvety. Leaves $3\frac{1}{2}$–7 by $1\frac{1}{4}$–$2\frac{1}{2}$ in. (sometimes 10 in. long, *Talbot*), elliptic-oblong, acuminate (the acumen often very long), glabrous and shining on both sides; main nerves 6–10 pairs, arched; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long; stipules $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear, acute. Flowers in axillary and terminal, solitary or paniculate racemes, the male and female flowers with short stout pedicels; bracts $\frac{1}{12}$ in. long, setaceous. MALE FLOWERS: Calyx cup-shaped, $\frac{1}{16}$ in. long, 4-lobed from above the middle, the lobes rounded. Stamens 3–4, inserted between the lobes of the glabrous disk; filaments $\frac{1}{16}$ in. long. Pistillode columnar, glabrous. FEMALE FLOWERS: Calyx $\frac{1}{16}$ in. long, cup-shaped, 4-lobed from about the middle, the lobes acute. Ovary glabrous; stigmas 3–5. Fruit $\frac{1}{6}$–$\frac{1}{4}$ in. long, ovoid, acute. Fl. B. I. v. 5, p. 364; Talb. Trees, Bomb. ed. 2, p. 308; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Watt, Dict. Econ. Prod. v. 1, p. 270. *Antidesma lanceolatum*, Dalz. & Gibs. p. 237 (*not* of Tul.).—Flowers: Feb.–May.

Evergreen forests of the Konkan and N. Kanara, also along nálas in deciduous moist forests, *Talbot*. *Dalzell* without locality in Herb. Kew.! *Lambert* without locality in Herb. Kew.! KONKAN: *Law*!—DISTRIB. India (W. Peninsula).

VAR. *linearifolia*, Hook. f. Fl. B. I. v. 5 (1887) p. 364. Leaves 3–5 by $\frac{1}{2}$–$1\frac{1}{2}$ in., linear-oblong, shining on both sides.

Dalzell without locality in Herb. Kew.! KANARA: common in the Siddapur taluka of N. Kanara, *Talbot*; Ainshi (N. Kanara), *Woodrow*.

16. APOROSA, Blume.

Trees. Leaves coriaceous, alternate, entire (rarely sinuate-toothed). Flowers minute, dicœcious (rarely monœcious), the males most minute, in axillary catkin-like spikes, the females sessile or shortly pedicellate, in short bracteate spikes; the bracts concave and imbricating. MALE FLOWERS: Sepals 3–6 (usually 4), membranous, imbricate. Petals 0. Disk 0. Stamens 2–5 in the centre of the flower; filaments free, capillary; anthers didymous. Pistillode minute or 0. FEMALE FLOWERS: Sepals as in the male but larger. Petals 0. Disk 0. Ovary 2 (rarely 3)-celled; ovules 2 in each cell; stigmas small, plumose, simple or 2–4-cleft, spreading and recurved (rarely elongate and 2-partite). Fruit an ellipsoid ovoid or globose capsule, opening irregularly or partially, 2–4-valved from the base upwards; epicarp thin or thick and spongy or fleshy; endocarp thin, often separable; cells glabrous or hairy within, especially on the septum. Seeds oblong or suborbicular, usually plano-convex; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species 30–40, tropical Asiatic and Malayan.

1. **Aporosa Lindleyana,** *Baillon, Etud. Gen. Euphorb.* (1858) p. 645. A small or middle-sized tree; bark thin, smooth. Leaves thinly coriaceous, $3\frac{1}{2}$–$6\frac{1}{2}$ by $1\frac{3}{8}$–$2\frac{1}{4}$ in., elliptic-oblong, acuminate, glabrous, base acute or rounded; main nerves 8–10 pairs, slender;

petioles $\frac{1}{3}$–$\frac{1}{2}$ in. long; stipules lanceolate, acute, soon falling. MALE FLOWERS sessile; spikes 1–1½ in. long, dense. Sepals usually 4, ovate-oblong, obtuse, $\frac{1}{20}$ in. long, ciliate. Stamens 2–3; filaments $\frac{1}{16}$ in. long; anthers subglobose. FEMALE FLOWERS in very short, hairy, often clustered racemes; pedicels short. Sepals ovate, subacute, $\frac{1}{16}$ in. long. Ovary flask-shaped, shortly pedicellate, hairy: style short, with 3 large laciniate curved stigmas $\frac{1}{20}$ in. long. Fruit $\frac{3}{8}$ in. or slightly more in diam., quite globose, pointed with the style. Seeds plano-convex, broadly ovate, subacute, ¼ in. long and as broad as long. Fl. B. I. v. 5, p. 349; Bedd. Flor. Sylvat. t. 286; Trim. Fl. Ceyl. v. 4, p. 40; Talb. Trees, Bomb. ed. 2, p. 307; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 370. *Scepa Lindleyana*, Wight, Icon. v. 2, part 1, p. 5, t. 361; Dalz. & Gibs. p. 236.—Flowers: Dec.–Feb. VERN. *Sali.*

Common in the evergreen forests of the Konkan and N. Kanara, *Talbot.* KANARA: common, *Ritchie*, 1364!; Supa on the Kála naddi, *Ritchie*, 1364!; Arbail Ghát (N. Kanara), *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

17. **BACCAUREA,** Lour.

Evergreen trees. Leaves alternate, entire (rarely crenate-serrate), penninerved. Flowers diœcious (rarely monœcious), in simple or panicled spikes or racemes. Perianth simple, the male flowers usually very small. MALE FLOWERS: Sepals 4–5, usually unequal, imbricate. Petals 0. Disk 0 or obscure and glandular. Stamens 4–8; filaments short, free; anthers small, didymous. Pistillode pubescent, orbicular, sessile or stipitate, rarely an irregular cleft column. FEMALE FLOWERS: Sepals 4–6, linear or oblong, much larger than in the male. Petals 0. Disk 0. Ovary ovoid or globose, 2–5-celled; ovules 2 in each cell; stigmas 2–5, small, sessile, free or connate into a short style, each 2-lobed or 2-cleft, the arms wide or narrow, papillose, rarely united into one peltate stigma. Fruit a tardily dehiscent ovoid globose obovoid or fusiform 2–4-celled capsule; pericarp thick or thin, coriaceous, crustaceous or woody. Seeds broad, usually dorsally compressed or flattened, covered by a thick fleshy aril; albumen fleshy or hard; cotyledons broad, flat. —DISTRIB. Species about 30, mostly Indo-Malayan, a few in Tropical Africa and Polynesia.

1. **Baccaurea courtallensis,** *Muell. Arg. in DC. Prodr.* v. 15, part 2 (1866) p. 459. A large or middle-sized tree; young parts minutely pubescent. Leaves 3–8 by 1¼–3 in., elliptic, shortly acuminate, glabrous, base usually acute; petioles ¾–1½ in. long; stipules ovate, deciduous. MALE FLOWERS very small, reddish, in puberulous racemose panicles 7–10 in. long, generally much crowded on the trunk; pedicels scarcely $\frac{1}{20}$ in. long, crowded in little clusters of 3–7 together with or without a short peduncle, and with an ovate concave bract at the base. Sepals 4–6, scarcely $\frac{1}{12}$ in. long. Stamens 5–10. Pistillode discoid, entire or 2–5-lobed. FEMALE FLOWERS about twice as large as the male, in simple puberulous racemes 8–12 in. long; pedicels $\frac{1}{12}$–$\frac{1}{8}$ in. long, irregularly arranged along the rhachis, and with a minute bract at the base of each. Sepals usually 5 (less commonly 6, 7 or 8), mostly unequal, $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovate, acute. Ovary ovoid, truncate, hairy, 3-celled; stigma sessile, 3-lobed. Fruit subglobose, 1 in. or more in diam., rough, with 3 prominent ridges running from the apex to the

base, bright crimson when ripe, hanging in great profusion from the trunk, which appears as a crimson mass (*Beddome*). Seeds enclosed in a succulent edible aril. Fl. B. I. v. 5, p. 367; Talb. Trees, Bomb. ed. 2, p. 309. *Baccaurea sapida*, Bedd. Fl. Sylvat. t. 280 (*not* of Muell. Arg.). *Pierardia macrostachya*, Wight, Icon. tt. 1912 & 1913.

This has been included on the authority of Talbot (Trees, Bomb. ed. 2, p. 309), who gives it as occurring at Sungsal (*N. Kanara*). There is but one very imperfect specimen in Herb. Kew. from the Anamali Hills, though Beddome says that it is abundant in moist forests of the Western Ghâts from Kanara to Travancore.—DISTRIB. India (W. Peninsula).

18. **JATROPHA,** Linn.

Herbs, shrubs, or trees, often glandular or prickly. Leaves alternate, often digitately lobed; stipules often ciliate. Flowers monœcious, in terminal cymes, the central flowers in the cyme or its forks usually female. Perianth usually double. MALE FLOWERS: Calyx 5-lobed or -partite, the segments often colored, imbricate. Petals 5, free or connate. Disk entire or of 5 glands. Stamens numerous; filaments of all or of the interior only connate below; anthers erect, ovate or oblong, the cells parallel, contiguous. Pistillode 0. FEMALE FLOWERS: Calyx as in the male. Petals sometimes absent. Ovary 2–4-celled; ovules solitary in each cell; styles connate below, 2-fid above, the lobes entire or again 2-lobed. Fruit a capsule of 2–4 cocci; cocci 2-valved; endocarp crustaceous or hard. Seeds ovoid or oblong; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species about 70, chiefly American.

A small tree reaching 8 ft. high; margins of leaves with gland-tipped hairs	1. *J. glandulifera.*
A shrub 1–1½ ft. high; margins of leaves without gland-tipped hairs	2. *J. nana.*

1. **Jatropha glandulifera,** *Roxb. Fl. Ind.* v. 3 (1832) p. 688. A small evergreen tree containing much clear pale-yellow juice; trunk short, stout, dichotomously branched. Leaves 2½–5 in. long, and as broad as long, palmately 3–5-lobed below the middle, the posterior lobes the smaller; lobes obovate or elliptic, shortly and acutely acuminate, glabrous, the margins serrate, each serrature ending in a gland-tipped bristle, base cordate with a broad but shallow sinus; main nerves numerous, slender; petioles 2–5 in. long, without glandular hairs; stipules very long, divided into many filiform segments, each with a glandular head. Flowers monœcious, greenish-yellow, in glandular corymbose cymes; bracts long, lanceolate, acute, with gland-tipped hairs on the margins. MALE FLOWERS: Calyx ⅛ in. long, divided almost to the base; segments ovate, obtuse. Stamens 8, all united into a column in the lower half, free above. Disk of 5 glands at the base of the staminal-column. Corolla ⅕ in. long, 5-lobed; lobes ⅛–⅙ in. long, oblong-obovate, rounded, veined. FEMALE FLOWERS: Calyx divided to the base or nearly so; segments 5, ovate, acute. Capsules reaching ½ in. long, ellipsoid-oblong, smooth, 3-lobed. Seeds ellipsoid-oblong, ⅓ in. long, smooth and shining, black. Roxburgh (*l. c.*), in a footnote, cautions botanists against assuming, after a cursory examination, that the petals of the corolla are free. They separate very easily, but close examination

shows them to be connate at the base, as Roxburgh has described them. Fl. B. I. v. 5, p. 382; Dalz. & Gibs. p. 229; Trim. Fl. Ceyl. v. 4, p. 45; Talb. Trees, Bomb. ed. 2, p. 309; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Watt, Dict. Econ. Prod. v. 4, p. 548. *Jatropha glauca*, Vahl, Symb. v. 1 (1790) p. 78; Grah. Cat. p. 183.—Flowers: Aug.–Nov. VERN. *Underbibi*; *Jangli-erand*..

DECCAN: Pandarpur (near Sholapur), abundant, *Graham*, *Dalzell & Gibson*, *Talbot*, *Woodrow*!; Kaladgi, *Law*!—DISTRIB. India (apparently limited to the 2 localities mentioned); Ceylon (abundant in some places near the sea-coast), Tropical Africa.

It is very doubtful if this plant is indigenous in the Bombay Presidency. The only places apparently in which it is to be found are Pandarpur and Kaladgi in the Deccan. There is a legend concerning the first springing up of the plant at Pandarpur. Pandarpur is the scene of an annual fair which is attended by thousands of native devotees, and it is quite intelligible that a few seeds might have been accidentally imported by some of them. Roxburgh (Fl. Ind. l. c.) states that he has been unable to find how the plant originally reached the Botanic Garden at Calcutta. Trimen (Fl. Ceyl. v. 4, p. 46) is of opinion that the plant is an introduction in Ceylon, where it is abundant in a few places near the coast.

2. **Jatropha nana,** *Dalz. in Dalz. & Gibs. Bo. Fl.* (1861) p. 229. A glabrous undershrub 1–1½ ft. high; root woody, as thick as the finger; stem round, smooth, not much branched; branches erect. Leaves large for the size of the plant, 3–5 in. long and about as broad as long, broadly ovate, entire or 3-lobed from above the middle, the lobes with entire naked margins, ovate, obtuse or subacute, the middle lobe the largest, base cuneate, with three strong nerves from the base; petioles variable in length, ⅛–1 in. long; stipules not seen. Flowers pedicellate in few-flowered terminal paniculate cymes; bracts lanceolate, acute, the margins not glandular. MALE FLOWERS: Calyx ⅛ in. long, glabrous, divided about ½ way down; lobes ovate, subobtuse. Stamens 8, all united in the lower half; disk of minute glands. Corolla ¼ in. long, glabrous outside; segments almost or wholly free to the base, obovate, cuneate, densely glandular-hairy at the base-inside. FEMALE FLOWERS: Calyx ⅛–⅙ in. long, divided almost to the base, glabrous; segments lanceolate, subacute. Corolla nearly ⅜ in. long; petals free, obovate-oblong, glabrous outside, glandular-hairy at the base inside. Ovary glabrous, obovoid, seated on a somewhat saucer-shaped glandular disk. Style ⅛ in. long, divided into 3 branches from about the middle, each of the branches again divided at the apex into 2 somewhat triangular lobes about 1/20 in. long. Capsules ⅜ in. long, obovoid-oblong, flattened at the top, slightly 6-lobed. Fl. B. I. v. 5, p. 382; Talb. Trees, Bomb. ed. 2, p. 309; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Watt, Dict. Econ. Prod. v. 4, p. 549.—Flowers: May–July.

DECCAN: hills near Poona, *Dalzell*!, *Cooke*!, *Woodrow*!; Bowdhan 8 miles west of Poona, *Kanitkar*!; Chattarsinghi Hill near Poona, *Cooke*!—DISTRIB. Apparently endemic in the Deccan.

Jatropha gossypifolia, Linn. Sp. Pl. (1753) p. 1006. A shrub, a native of Brazil, cultivated in gardens and found as an escape. Leaves palmately 3–5-lobed, at first brown, afterwards becoming green; petioles ong, clothed with numerous fascicled and branched gland-tipped bristles. Corolla red. This is often mistaken for *J. glandulifera*, w hich it much resembles. Fl. B. I. v. 5, p. 383; Dalz. & Gibs. Suppl. p. 78; Talb.

Trees, Bomb. ed. 2, p. 310; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371 & Gard. in Ind. ed. 5, p. 442; Prain, Beng. Pl. p. 941.

Jatropha multifida, Linn. Sp. Pl. (1753) p. 1006. A glabrous shrub, a native of America, cultivated everywhere in gardens, and known as the *Coral Plant*. It has orbicular leaves 3–9 in. in diam., palmately cut into many narrow entire or subdivided segments. Peduncles and flowers scarlet. Fl. B. I. v. 5, p. 383; Grah. Cat. p. 183; Talb. Trees, Bomb. ed. 2, p. 309; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371 & Gard. in Ind. ed. 5, p. 442; Prain, Beng. Pl. p. 941.

Jatropha podagrica, Hook. Bot. Mag. (1848) t. 4376. A small shrub with a curious gouty stem, large peltate leaves and small bright red flowers, a native of New Grenada, often grown in conservatories, but thriving well on a bank of rich soil fully exposed to the sun and regularly watered. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371 & Gard. in Ind. ed. 5, p. 442.

Jatropha Curcas, Linn. Sp. Pl. (1753) p. 1006. A soft-wooded shrub or small tree, a native of Tropical America, commonly grown as a fence near villages. The cut branches sprout readily and grow rapidly, which accounts for its being used for this purpose, as it really makes anything but a good fence. The leaves are angular or 3–5-lobed, 4–6 in. long, and the flowers are yellowish-green. Stamens 10, the 5 inner connate into a central column. The seed is known as the *Physic-nut* and is a violent purgative. Fl. B. I. v. 5, p. 383; Grah. Cat. p. 183; Dalz. & Gibs. Suppl. p. 77; Talb. Trees, Bomb. ed. 2, p. 309; ; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371 & Gard. in Ind. ed. 5, p. 442; Prain, Beng. Pl. p. 941; Watt, Dict. Econ. Prod. v. 4, p. 545.—VERN. *Mogali-eranda*.

The seeds are used by the poorer classes as a purgative and yield an illuminating oil. The Chinese are said to form a varnish by boiling the oil with oxide of iron.—The juice from the stems is very elastic, like caoutchouc, and native boys blow bubbles with it from the end of a straw. When dried it forms a brittle substance like shellac, which may perhaps be utilized. See Watt, Dict. Econ. Prod. l. c.

Jatropha hastata, Jacq. Enum. Pl. Carib. (1760) p. 32. A pretty shrub with panduriform leaves and crimson flowers in terminal corymbose cymes, a native of Cuba.

Jatropha panduræfolia, Andr. Bot. Rep. t. 267; Woodr. Gard. in Ind. ed. 5, p. 442.

19. **CROTON**, Linn.

Trees or shrubs (rarely herbs). Leaves usually alternate, usually 2-glandular at the base. Flowers monœcious (in the Indian species), solitary or clustered on the rhachis of a terminal raceme; bracts small. MALE FLOWERS: Calyx 5 (rarely 4–6)-partite; segments imbricate or subvalvate. Petals 5 (rarely 4–6), never exceeding but sometimes shorter than the calyx. Disk of 4–6 glands opposite the sepals. Stamens many, inserted on a hairy receptacle; filaments free, inflexed in bud, at length straight; anthers adnate, with parallel cells. Pistillode 0.

FEMALE FLOWERS: Sepals usually more ovate than in the male, rarely accrescent in fruit. Petals smaller than the sepals or obsolete. Disk annular, or of 4–6 glands opposite the sepals. Ovary 3 (rarely 2–4)-celled; ovule solitary in each cell; style usually long and slender, 2–4-cleft. Capsule subequally 6-valved, or of 3 separating 2-valved cocci. Seeds smooth; caruncle small; testa crustaceous; albumen copious; cotyledons broad.—DISTRIB. All hot countries; number of species uncertain, 500 described.

Fruit with scales as well as stellate hairs; leaves silvery beneath with white scales	1. *C. reticulatus.*
Fruit with orbicular small scales, but without stellate hairs; leaves glabrous when mature	2. *C. oblongifolius.*
Fruit with stellate hairs, but without scales; leaves with a few scattered stellate hairs, but without scales	3. *C. Gibsonianus.*

1. **Croton reticulatus,** *Heyne, in Wall. Cat.* (1828) 7724 B. A shrub or small tree; branchlets, petioles, and rhachis covered with ferruginous easily detachable scales. Leaves 2½–6 by 1–2 in., elliptic-lanceolate, acute or acuminate, entire, glabrous above, clothed beneath with silvery scales, base acute or rounded, furnished with a pair of stipitate glands; petioles ¼–1¼ in. long; stipules subulate. Flowers pedicellate, clothed with silvery scales, in terminal racemes shorter than the leaves, the females few at the base of the raceme. MALE FLOWERS: Buds globose. Pedicels $\frac{1}{16}$–$\frac{1}{8}$ in. long, slender. Sepals $\frac{1}{10}$ in. long, ovate-oblong, obtuse, ciliolate. Petals slightly shorter than the sepals, obovate, obtuse. Stamens 14–20, inserted on a hairy receptacle. FEMALE FLOWERS: Pedicels stout, $\frac{1}{10}$ in. long. Calyx $\frac{1}{6}$–$\frac{1}{4}$ in. long; sepals oblong-lanceolate, much enlarged in fruit. Ovary with reddish-brown scales and stellate hairs. Style about ¼ in. long, 3-branched shortly above the base, each branch again 2-branched and again divided into 2 long linear lobes at the apex. Capsules ovoid-oblong, under ½ in. long, slightly 3-lobed, apiculate, with reddish-brown stellate hairs mixed with scales. Seeds purplish-brown mottled with white. Fl. B. I. v. 5, p. 386; Bedd. Icon. Pl. Ind. Or. t. 233; Trim. Fl. Ceyl. v. 4, p. 47; Talb. Trees, Bomb. ed. 2, p. 311; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Watt, Dict. Econ. Prod. v. 2, p. 617. *Croton hypoleucos,* Dalz. in Kew Journ. Bot. v. 3 (1851) p. 123; Dalz. & Gibs. p. 231.—Flowers: Oct.–Jan. VERN. *Pándri.*

KONKAN: hills, rather rare, *Dalzell!*; Matheran, *Cooke!, Macnaghten!*; Ambeghát, *Woodrow!* DECCAN: Phonda Ghát, *Ritchie,* 1348! S. M. COUNTRY: Parle (Belgaum districts), *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

2. **Croton oblongifolius,** *Roxb. Fl. Ind.* v. 3 (1832) p. 685. A middle-sized tree; young shoots, branchlets, inflorescence, calyx, and ovary clothed with minute orbicular silvery scales. Leaves 5–10 by 2¼–4½ in., crowded towards the ends of the branchlets, oblong-lanceolate, subacute, glabrous when fully grown, more or less crenate or serrate, penninerved, base usually acute with no apparent glands above the petioles; main nerves numerous, slender; petioles ¾–1½ in. long. Flowers pale yellowish-green, solitary or fascicled in the axils of minute bracts on long erect often fascicled racemes, the males in the upper part of the raceme, the females in the lower part. MALE FLOWERS: Pedicels

variable in length, reaching $\frac{1}{6}$ in. long, slender. Calyx more than $\frac{1}{4}$ in. across when flattened out, divided about $\frac{3}{4}$ the way down; segments more than $\frac{1}{10}$ in. long, ovate, obtuse. Petals $\frac{1}{8}$ in. long, elliptic-lanceolate, obtuse, woolly. Stamens 12, inflexed in bud; filaments $\frac{1}{8}$ in. long, the lower half hairy. FEMALE FLOWERS: Pedicels short, stout. Sepals more acute than in the male with densely ciliate margins. Petals $\frac{1}{12}$ in. long, obovate, with densely woolly margins. Styles 3, nearly $\frac{1}{6}$ in. long, each again subdivided into 2 long slender curled branches $\frac{1}{8}$ in. long. Capsules less than $\frac{1}{2}$ in. in diam., subglobose, a little depressed, slightly 3-lobed, clothed with small orbicular scales. Seeds $\frac{1}{3}$ by $\frac{1}{4}$ in., ellipsoid, rounded and quite smooth on the back. Fl. B. I. v. 5, p. 386; Dalz. & Gibs. p. 231; Bedd. For. Man. in Flor. Sylvat. p. cciv; Trim. Fl. Ceyl. v. 4, p. 47; Talb. Trees, Bomb. ed. 2, p. 311; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Prain, Beng. Pl. p. 943; Watt, Dict. Econ. Prod. v. 2, p. 616.

Rare. KONKAN: *Stocks*!; Fort of Banda, *Dalzell & Gibson*.—DISTRIB. India (Silhet, Bengal, Chota Nagpur, Central Provinces, Birma, W. Peninsula); Ceylon.

3. **Croton Gibsonianus,** *Nimmo, in Grah. Cat. Pl. Bomb.* (1839) p. 251. A tall nearly glabrous shrub. Leaves 3–7 by $1\frac{1}{4}$–$2\frac{1}{2}$ in., elliptic-oblong, acuminate, minutely serrate, glabrous or with a few stellate hairs, base rounded, usually with 2 stipitate glands; main nerves 6–8 pairs, slender, with reticulate venation between; petioles $\frac{1}{2}$–1 in. long, often with a few stellate hairs at the apex and at the base. Flowers in long slender racemes 5–10 in. long, the males often fascicled, the females usually solitary and near the base of the raceme; bracteoles minute, linear. MALE FLOWERS: Pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long, filiform. Calyx $\frac{1}{8}$ in. long, divided nearly to the base; segments ovate, acute, membranous. Petals $\frac{1}{10}$ in. long, oblong, ciliate. Stamens 10, on a hairy receptacle. Disk of 5 large glands. FEMALE FLOWERS: Pedicels $\frac{1}{8}$ in. long, stout, stellately hairy. Calyx stellately hairy, especially at the base; sepals $\frac{1}{6}$ by $\frac{1}{12}$ in., ovate, acute. Petals 0. Disk saucer-shaped. Ovary globose, densely stellately hairy; styles 3, reaching $\frac{1}{4}$ in. long, each subdivided almost to the base into 2 linear branches. Capsules globose, $\frac{1}{2}$ in. in diam., 3-lobed, stellately hairy. Seeds $\frac{1}{3}$ by $\frac{1}{3}$ in., broadly ellipsoid, smooth, shining, brown, mottled. Fl. B. I. v. 5, p. 392; Dalz. & Gibs. p. 232; Talb. Trees, Bomb. ed. 2, p. 311; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371.—Flowers: Nov.

KONKAN: *Gibson*! DECCAN: near Nasik, *Dalzell & Gibson*; Harishchandragad, *Graham*. KANARA: *Law*!; near Gairsoppa Falls, *Woodrow, Talbot*, 288!; moist forests on the Ghâts to the south, *Talbot*.—DISTRIB. India (W. Peninsula).

Croton Tiglium, Linn. Sp. Pl. (1753) p. 1004. A small evergreen tree grown for the oil produced from its seeds and becoming naturalized in the S. Konkan. Young shoots sparsely stellately hairy. Leaves 2–4 in. long, thinly membranous, glabrous, ovate, acuminate, serrate, 3–5-nerved. Stamens 15–20. Capsules $\frac{3}{4}$–1 in. long, white, turbinately ovoid, obtusely trigonous. Fl. B. I. v. 5, p. 393; Grah. Cat. p. 182; Talbet, Trees, Bomb. ed. 2, p. 311; Prain, Beng. Pl. p. 943; Watt, Dict. Econ. Prod. v. 2, p. 617.

The seeds yield a yellowish oil which is used as a drastic purgative and as a rubefacient. The plant was at one time grown at Hewra near Poona, and the capsules sent to the Medical Stores at Bombay, where the oil was expressed. The supply is now imported from China *viâ* Singapore. See Watt, Dict. Econ. Prod. l. c.

Excluded Species.

CROTON AROMATICUS, Linn. Sp. Pl. (1753) p. 1005. A slightly aromatic shrub or small tree; bark smooth, pale-grey; young parts rough with harsh stellate hairs. Leaves 2½–4 by 1½–3 in., ovate, acute, irregularly and shallowly crenate-serrate, slightly rough with a few stellate hairs above, much more so, especially on the nerves, beneath, base 3–5-nerved, rounded or cordate, usually with 2 (rarely 4) stalked peltate circular glands; petioles ½–1¼ in. long, rough. Flowers numerous, pedicellate, in terminal racemes 4–6 in. long, the males in the upper half of the raceme; bracts small, lanceolate, acute. Male flowers: Sepals acute, $\frac{1}{12}$ in. long, stellately hairy. Petals as long as the sepals, bordered with white hair. Stamens 20–30, on a densely white-woolly receptacle. Female flowers remote, on stout pedicels. Ovary stellately hispid; style-branches 3, each again subdivided. Fruit less than ½ in. in diam., subglobose, 3-lobed, rough with short stellate hairs. Fl. B. I. v. 5, p. 388; Wight, Icon. t. 1915; Trim. Fl. Ceyl. v. 4, p. 47; Talb. Trees, Bomb. ed. 2, p. 311; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Watt, Dict. Econ. Prod. v. 2, p. 615.

I cannot find any evidence in favour of the plant being indigenous in the Bombay Presidency. There is one sheet in Herb. Kew. marked *Herb. Stocks*, but, as no habitat is given, the specimen might have been collected anywhere. Talbot (Trees, Bomb. ed. 2, p. 311) gives the Bababudin Hills above 4000 ft. (which are outside our area) as the habitat of the plant, and Woodrow in his list gives no habitat at all. The specimens in Herb. Kew. are from the Nilghiris, Kurg and Travancore, and the plant seems to be tolerably common in Ceylon.

CROTON LAWIANUS, Nimmo, in Grah. Cat. Pl. Bomb. (1839) p. 251. A small tree; branches slender, terete, smooth. Leaves coriaceous, 3–5 in. long, broadly ovate, caudate-acuminate, entire, strongly 3-nerved, the young leaves finely softly stellately hairy. Flowers in short slender racemes; bracts 0. Male flowers 3–5; pedicels capillary. Sepals ovate, obtuse, gland-dotted, sparsely stellately hairy. Petals larger, oblong, fimbriate. Stamens about 20. Disk of 5 large glands. Female flowers few. Pedicels stout, erect. Sepals large, oblong, glabrous, much enlarged and foliaceous in fruit. Ovary oblong, glabrous, 3-lobed; styles 3, united below, very stout, recurved, 2-lobed, the lobes 2-fid. Capsules ⅔ in. in diam., shorter than the enlarged leafy green sepals, thickly crustaceous, rugose, glabrous. Seeds ½–½ in. long, oblong, striately mottled brown and white. Fl. B. I. v. 5, p. 394; Dalz. & Gibs. p. 232; Talb. Trees, Bomb. ed. 2, p. 311.

Dr. Gibson states that this tree has been found at Bhimasankar, a high hill of the Western Ghâts, but no other collectors have found it, and, as Mr. Talbot remarks (Trees, Bomb. ed. 2, p. 312), it may perhaps be found in the southern parts of N. Kanara, but has not as yet been seen in the Bombay Presidency. The Bababudin Hills given as a habitat in the 'Flora of British India' are outside our area.

CROTON RHEEDEI, Grah. Cat. (1839) p. 182, described as an erect suffruticose plant 2 or 3 feet high with flowers in terminal spikes appearing in April, found on the Thal Ghât and in Salsette, cannot be identified. Fl. B. I. v. 5, p. 395.

CROTON GIBSONI, Grah. Cat. (1839) p. 182, described as an erect suffruticose species with petiolate cordate serrate leaves, much resembling the last species and found in the northern parts of the Deccan, cannot be identified. Fl. B. I. v. 5, p. 395.

CROTON RAMIFLORUS, Grah. Cat. (1839) p. 182, described as a small tree with alternate petiolate ovate-oblong leaves somewhat glaucous beneath, small white flowers growing from the naked branches, and fruit the size of a large pea half hidden in the calyx which grows into 5 scarious wings in shaded ravines at Khandala, but not common, flowering in October, cannot be identified. It is not improbable that it may be *Dimorphocalyx*. Fl. B. I. v. 5, p. 395.

20. **GIVOTIA,** Griff.

A small stellately tomentose tree. Leaves alternate, rounded and cordate, sinuate-toothed, 5–9-nerved at the base. Flowers in axillary and subterminal racemose or paniculate cymes, dicœcious. Disk entire or lobed. MALE FLOWERS: Sepals 5, broad, unequal, imbricate. Petals 5, longer, cohering in a subglobose 5-lobed corolla. Disk of orbicular glands. Stamens 13–25, crowded on a woolly receptacle; filaments connate below, erect; anthers ovate, dorsifixed, the cells parallel. Pistillode 0. FEMALE FLOWERS: Perianth of the male. Disk cupular. Ovary 2–3-celled; ovule solitary in each cell; styles short, spreading, 2-fid. Drupe subglobose; putamen crustaceous, 1-celled, 1-seeded. Seed globose or ellipsoid; testa bony; albumen fleshy; cotyledons broad, flat.—DISTRIB. Western Peninsula of India, Ceylon; species 1.

1. **Givotia rottleriformis,** *Griff. in Calc. Journ. Nat. Hist.* v. 4 (1844) p. 388. A soft-wooded middle-sized tree with stout branches; branchlets, petioles, underside of leaves, and sepals densely clothed with white stellate tomentum. Leaves 5–10 in. long and nearly as broad as long, broadly ovate or rotundate, cordate with a deep sinus, coarsely and irregularly dentate or incised, palmately nerved, acute, coriaceous, hoary becoming glabrous above, densely clothed beneath with white woolly stellate tomentum; nerves 5–7, basal, with several pairs above them; petioles stout, woolly-tomentose, 4–6 in. long, often with 1 or 2 glands. Flowers dicœcious, in axillary paniculate dense or lax-flowered cymes 4–8 in. long near the ends of the branches; pedicels jointed; bracts narrow, linear. Sepals 5, stellately hairy outside. Petals 5, longer than the sepals, more or less cohering. MALE FLOWERS: Disk of 5 orbicular glands. Stamens 13–25; filaments connate below, erect, hairy at the base, on a woolly receptacle. Sepals $\frac{1}{8}$ in. long. Corolla $\frac{1}{4}$ in. long, campanulate with rounded lobes. FEMALE FLOWERS: Disk cup-shaped. Ovary stellately hairy, 2–3-celled. Drupe $\frac{3}{4}$–1 in. in diam., subglobose. Fl. B. I. v. 5, p. 395; Dalz. & Gibs. p. 228; Wight, Icon. t. 1889; Bedd. Flor. Sylvat. t. 285; Trim. Fl. Ceyl. v. 4, p. 50; Talb. Trees, Bomb. ed. 2, p. 312; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Watt, Dict. Econ. Prod. v. 3, p. 503.—Flowers: July–Sept. VERN. *Polki.*

DECCAN: Kartriz Ghát near Poona, *Bhiva!*, *Woodrow.* S. M. COUNTRY: Dharwar, *Talbot*; Belgaum districts, *Talbot.* KANARA: Diggi, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

The wood, which is light, white, and even-grained, is employed in the manufacture of toys, imitation fruits and other fancy articles; the surface takes paint readily. The seeds yield an oil which is used as a lubricant for fine machinery.

21. **BLACHIA,** Baill.

Glabrous shrubs or small trees. Leaves alternate or the upper subopposite, shortly petiolate, entire, penninerved. Flowers monœcious or subdiœcious, the males terminal, subumbellate or racemose on filiform pedicels, the females solitary or fascicled on stout pedicels thickened above. MALE FLOWERS: Sepals 4–5, concave, membranous, imbricate. Petals small, rounded, hyaline. Disk-glands scale-like, alternating

with the petals. Stamens 10–30, on a convex receptacle; filaments free; anther-cells on the margin of the connective, the tips at length confluent. Pistillode 0. FEMALE FLOWERS: Sepals lanceolate or oblong, accrescent or sometimes caducous. Petals 0. Disk obscure or annular. Ovary 3–4-celled; ovule 1 in each cell; styles distinct, filiform, 2-partite. Capsule of three 2-valved cocci. Seeds oblong, estrophiolate; testa crustaceous, shining; albumen fleshy; cotyledons broad, flat.—DISTRIB. Western Peninsula of India, Ceylon, 1 species in China; species 5 or 6.

1. **Blachia denudata,** *Benth. in Journ. Linn. Soc.* v. 17 (1880) p. 226. A large shrub or small tree reaching 30 ft. high and 3 in. in diam.; bark smooth. Leaves very variable, $2\frac{1}{2}$–6 by 1–$2\frac{1}{2}$ in., oblong-lanceolate or ovate, obtuse, acute or acuminate, entire, glabrous, penninerved, base usually acute; main nerves 6–8 pairs, slender; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers in terminal racemes, the males at the top, the females few at the base of the raceme. MALE FLOWERS: Pedicels $\frac{1}{6}$ in. long, filiform. Sepals usually 4, membranous, suborbicular, concave, imbricate, $\frac{1}{6}$ in. in diam. Petals much smaller than the sepals, hyaline, $\frac{1}{30}$–$\frac{1}{20}$ in. long, broadly obovate. Glands of the disk scale-like, as long as the petals, oblong, slightly 3-lobed. Stamens 10–30; filaments $\frac{1}{16}$–$\frac{1}{20}$ in. long, flattened; anthers somewhat horseshoe-shaped, the cells on the margin of the connective. FEMALE FLOWERS: Pedicels stout, thickened upwards. Sepals ovate-lanceolate, acute, very deciduous. Petals 0. Styles 3, deeply 2-fid. Capsules ellipsoid or subglobose, $\frac{1}{3}$–$\frac{1}{2}$ in. long, glabrous, deeply 3-lobed, of three 2-valved cocci. Seeds reaching $\frac{3}{8}$ by $\frac{1}{4}$ in., ellipsoid, smooth and shining, brown mottled with white. Fl. B. I. v. 5, p. 403; Talb. Trees, Bomb. ed. 2, p. 312; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371. *Blachia umbellata,* Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371 (*not* of Baill.). *Croton umbellatum,* Dalz. & Gibs. Bo. Fl. (1861) p. 231 (exclud. syn.).

Dalzell & Stocks, without locality in Herb. Kew.! KONKAN: Goa jungles, *Dalzell*! S. M. COUNTRY: Chorla Ghát, *Dalzell & Gibson.* KANARA: evergreen forests near the Gairsoppa Falls, *Talbot,* 283!; N. Kanara, *Talbot,* 284!; Karwar, *Woodrow.*—DISTRIB. India (W. Peninsula).

22. **DIMORPHOCALYX,** Thwaites.

Glabrous trees. Leaves alternate, petiolate, quite entire, coriaceous, penninerved, stipulate. Flowers dioecious (rarely monoecious), the males solitary or in clusters on the old wood, the females solitary or 2–3 together, terminal or leaf-opposed. MALE FLOWERS: Calyx cup-shaped, normally 5-toothed or -lobed, open in bud. Petals normally 5, erect, imbricate, longer than the calyx. Disk-glands alternate with the petals. Stamens 10–20 in two rows, often with an odd stamen at top; filaments connate in a column; anthers dorsifixed or innate, the cells adnate to a thick connective, parallel or divergent. Pistillode 0. FEMALE FLOWERS: Calyx divided almost to the base; sepals 5, oblong or oblong-lanceolate, obtuse, imbricate, enlarging greatly in fruit. Petals 5. Disk annular. Ovary 3-celled; ovule 1 in each cell; styles 3, connate at the base, 2-fid. Capsule of three 2-valved crustaceous cocci surrounded at the base by the persistent calyx, capped with the styles. Seed ovoid;

testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species 3 or 4, South Indian and Malayan.

1. **Dimorphocalyx Lawianus,** *Hook. f. Fl. B. I.* v. 5 (1887) p. 404. A small or middle-sized tree. Leaves 3–7 by 1½–3 in., elliptic-lanceolate, obtuse or obtusely acuminate (rarely subacute), glabrous, reticulately veined, dark-green above, paler beneath, base usually acute; petioles ¼–½ in. long; stipules small, triangular. Flowers dicœcious (rarely monœcious), the males usually solitary on the old wood, shortly pedicellate, the females solitary or 2–3 together on long pedicels, with usually a small bract on the pedicel. MALE FLOWERS: calyx ⅕ in. long, open in bud, with 5 (rarely 4) shallow distant rounded lobes about $\frac{1}{16}$ in. long. Petals 5 (rarely 4), ⅜ by ⅛ in., oblong, obtuse. Staminal-column ⅜ in. high, on a hairy receptacle; stamens 10–14 (*Beddome*), often 11 in 2 rows of 5 each and a terminal one, the filaments of the outer row connate at the base, the free portion about $\frac{1}{10}$ in. long, those of the second series connate into a column, the free portion very short scarcely $\frac{1}{30}$ in. long, the uppermost solitary stamen with a filament $\frac{1}{16}$ in. long. FEMALE FLOWERS: calyx divided almost to the base; sepals in fruit reaching ⅞ by ½ in. or more, variable in size and shape, often unequal, oblong or oblong-lanceolate, obtuse, parallel-nerved and reticulately veined. Disk annular, hairy. Ovary ovoid, densely hairy; styles ⅓ in. long, connate at the very base, each deeply divided into 2 branches, the branches again 2-fid at the apex. Capsules ½ in. in diam., globose, hairy, 3-lobed. Seeds ⅜ by ¼ in., ellipsoid, yellowish mottled with brown. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Talb. Trees, Bomb. ed. 2, p. 313. ? *Croton ramiflorum*, Grah. Cat. p. 182. *Trigonostemon Lawianus*, Muell. Arg. in Linnæa, v. 34 (1865) p. 212; Bedd. Flor. Sylvat. t. 273 (exclud. syn.).—Flowers Mar.–Oct.

Dalzell without locality in Herb. Kew. KONKAN: *Law!*; Matheran, *Cooke!*, *H. M. Birdwood.* DECCAN: Khandala, *Woodrow!* KANARA: Southern Ghâts between Nilkund and Gairsoppa, *Talbot.*—DISTRIB. India (W. Peninsula).

This plant seems to be scarcely distinct from *Dimorphocalyx glabellus*, Thwaites, from which it differs chiefly in the greater size of its parts. I have examined several (5 or 6) male flowers and have not found 15 stamens in any of them, 11 in 2 rows of 5 each, with an odd one at top, being the usual complement. The sepals are very variable in size and shape and are not always unequal.

Trimen (Fl. Ceyl. l. c.) alludes to the variableness of *C. glabellus* and states that the difference in appearance between the male and female plants has sometimes led to their being collected as separate species.

23. AGROSTISTACHYS, Dalzell.

Glabrous shrubs or small trees. Leaves alternate, coriaceous, usually very long, petiolate or subsessile, entire, serrate or sinuate, penninerved. Flowers dicœcious, in axillary or supra-axillary bracteate racemes or spikes, the males solitary or in small clusters within each bract, the female solitary. MALE FLOWERS: Calyx globose, splitting into 2–5 valvate lobes. Petals 5–8, shorter than the calyx. Disk-glands large, alternating with the petals. Stamens 8–13 on a convex receptacle; filaments nearly free; anthers versatile, the cells pendulous from the thickened connective. Pistillode 0 or 2–3-fid. FEMALE FLOWERS: Sepals 2–4. Petals usually 5, longer than the sepals, caducous. Ovary 3-celled; ovule 1 in each cell; styles short, thick, spreading, entire or

2-fid. Capsule of three 2-valved cocci. Seeds globose; testa crustaceous, shining; albumen fleshy; cotyledons broad, flat.—DISTRIB. Tropical India and Africa; species 8.

Leaves petiolate, serrate; male flowers solitary in the axils of the bracts; ovary glabrous	1. *A. indica.*
Leaves subsessile; male flowers many in the axils of the bracts; ovary pubescent	2. *A. longifolia.*

1. **Agrostistachys indica,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 41. A shrub 5–6 ft. high (*Dalzell*), reaching 15 ft. high (according to *Beddome*). Leaves numerous, thick, 5–11 by 1½–3½ in., elliptic-oblong or oblong-lanceolate, acute, coarsely and sharply serrate with incurved spinulose teeth, glabrous, base acute, running down into the petiole; main nerves 10–20 pairs, prominent, with reticulate venation between; petioles ½–1½ in. long. MALE FLOWERS minute, solitary in the axils of small imbricating, broadly ovate finely ciliate bracts arranged to form little grass-like spikelets, in axillary or supra-axillary clusters. Sepals membranous, ovate. Petals 5–8, rounded or subquadrate, white. Disk-glands very large. Stamens 8–13. FEMALE FLOWERS solitary, pedicellate, the pedicels with 3–5 scale-like bracts at the base. Ovary glabrous. Capsules ½ in. in diam., 3-lobed, glabrous, red. Seeds globose, pale brown. Fl. B. I. v. 5, p. 406; Dalz. & Gibs. p. 232; Bedd. For. Man. in Flor. Sylvat. p. ccv & Icon. Pl. Ind. Or. t. 241; Trim. Fl. Ceyl. v. 4, p. 55; Talb. Trees, Bomb. ed. 2, p. 313; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371.—Flowers: Feb.

Dalzell without locality in Herb. Kew. Western Peninsula on the Ghâts, from the Konkan southwards, *Talbot.* KONKAN: Talkat Ghât, *Dalzell & Gibson*; Sahyadri Mountains, *Dalzell.* S. M. COUNTRY: Belgaum districts, *Talbot.* KANARA: N. Kanara, in evergreen forests on the banks of streams, *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

2. **Agrostistachys longifolia,** *Benth. ex Hook. f. Fl. B. I.* v. 5 (1887) p. 407. A large shrub or small tree; branches stout, marked with the scars of petioles and stipules; young parts glabrous, very resinous. Leaves numerous, crowded at the ends of the branches, 6–20 by 1½–3 in., oblanceolate, nearly sessile, very shortly acuminate, quite entire, glabrous, stiff and leathery; main nerves 10–18 pairs, prominent beneath; stipules short, broad, acute, caducous. Flowers in lax spiciform racemes much shorter than the leaves, the males in clusters in the axils of single ovate bracts, the females fewer, solitary, distant along the rhachis, with longer often jointed pedicels. MALE FLOWERS: calyx about ⅛ in. long, membranous, glabrous. Sepals 2 or 3, entire. Petals 5, small. Disk-glands large. Stamens about 10. Pistillode 2–3-cleft. FEMALE FLOWERS: Sepals 5, ovate, acute. Disk large, lobed. Ovary pubescent. Capsules ⅜ in. in diam., 3-lobed; cocci globose, smooth, crustaceous. Seeds ⅙–⅕ in. in diam., globose, smooth, brown. Trim. Fl. Ceyl. v. 4, p. 56; Talb. Trees, Bomb. ed. 2, p. 313; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371. *Sarcoclinium longifolium,* Wight, Icon. v. 5 (1852) part 2, p. 24, tt. 1887–8; Bedd. For. Man. in Flor. Sylvat. p. ccv & Anal. Gen. t. 23, fig. 1.—Flowers: July–Oct.

KANARA: N. Kanara, *Woodrow*; evergreen forests on the Supa Ghâts along streams, *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

24. CHROZOPHORA, Neck.

Diffuse densely hispid or stellately tomentose herbs. Leaves alternate, sinuate-toothed or lobed, wavy or plicate, 2-glandular at the base. Flowers monœcious, in axillary bracteate racemes, the males crowded in the upper part of the raceme, the females solitary, pedicellate, in the lower part. MALE FLOWERS: Calyx globose or ovoid, splitting into 5 valvate segments. Petals 5, short. Disk obscure. Stamens 5–15; filaments connate below in a column in 1–3 series; anthers oblong, the cells parallel, contiguous. Pistillode 0. FEMALE FLOWERS: Sepals 5, narrow. Petals 5, very narrow, sometimes setaceous or obsolete. Disk of 5 short broad glands alternating with the petals. Ovary 3-celled; ovule solitary in each cell; styles erect or spreading, 2-fid. Capsule of 3 hispid, tomentose or lepidote, 2-valved, almost fleshy cocci. Seeds estrophiolate; testa shining; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species 4–6, Mediterranean, Asiatic, and African.

Ovary and capsule with stellate tomentum and silvery scales.
- A prostrate herb; stamens 15 in 2 whorls ..... 1. *C. tinctoria.*
- Shrubby erect; stamens 5 ..... 2. *C. obliqua.*

Ovary and capsule with stellate tomentum but without silvery scales.
- An erect stellately hairy herb; lower part of stem usually without branches; leaves pale, reaching 4 in. long; sepals of female flowers triangular ..... 3. *C. plicata.*
- A prostrate stellately woolly herb, diffusely branched from the root; leaves dark-brown, less than 1½ in. in diam.; sepals of female flowers linear ..... 4. *C. prostrata.*

1. **Chrozophora tinctoria,** *A. Juss. Tent. Euphorb.* (1824) p. 28, t. 7, fig. 25. An annual prostrate herb, the whole plant densely clothed with stellate tomentum; stems about 1 ft. long, branched, not stout. Leaves thick, softly stellately tomentose on both surfaces, 1¼–2¾ by 1¼–2½ in., from ovate and sinuate-toothed or entire to rounded and obtusely lobed; petioles ½–2½ in. long. Flowers in short racemes lengthening in fruit, the males numerous, crowded and sessile at the top of the raceme, the females pedicellate in the lower part, solitary; braets narrowly linear, $\frac{1}{16}$–$\frac{1}{12}$ in. long, hairy. MALE FLOWERS: Calyx ⅛–⅙ in. long, densely stellately tomentose. Petals 5, thin, membranous, elliptic-lanceolate, $\frac{1}{10}$ in. long. Stamens about 15 in 2 whorls. FEMALE FLOWERS: Pedicels often elongating in fruit. Calyx divided almost to the base, densely stellately tomentose; sepals 5, triangular, acute, $\frac{1}{10}$ in. long by $\frac{1}{30}$ in. wide at the base. Petals like the sepals but narrower and shorter, densely stellately tomentose. Ovary stellately tomentose and clothed with silvery scales; styles 3, each deeply 2-fid, usually spreading. Capsules ¼–⅜ in. in diam., clothed with stellate tomentum and silvery scales. Seeds ⅙ in. long, shining with a silvery sheen, slightly tuberculate. Fl. B. I. v. 5, p. 408; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Watt, Dict. Econ. Prod. v. 2, p. 621.—Flowers: Nov. VERN. *Okharáda.*

DECCAN: *Stocks!* GUJARAT: widely, *Woodrow.* SIND: *Dalzell!*—DISTRIB. India (Panjáb); Afghanistan and eastwards to the Mediterranean region.

The plant is cultivated in the south of France for the dye it yields. See Watt, Dict. Econ. Prod. l. c.

2. **Chrozophora obliqua,** *A. Juss. Tent. Euphorb.* (1824) p. 28. Shrubby, erect or suberect, much-branched, thickly stellately tomentose. Leaves 1–2 by ½–¾ in., ovate or ovate-lanceolate, sinuate-toothed, subobtuse, clothed on both sides with stellate tomentum, base rounded or cuneate, usually 2-glandular; main nerves few, prominent beneath; petioles ¼–1 in. long; stipules linear, soon falling. Flowers in axillary bracteate racemes, the males in the upper part sessile, the females in the lower part pedicellate; bracts linear, hairy, $\frac{1}{10}$ in. long. MALE FLOWERS: Calyx ⅛–¼ in. long, densely stellately tomentose. Petals thin, membranous, $\frac{1}{10}$ in. long. Stamens 5. FEMALE FLOWERS: Sepals $\frac{1}{10}$ in. long by $\frac{1}{30}$ in. wide at the base, triangular, very acute, stellately tomentose. Petals as the sepals but much narrower and shorter, stellately tomentose. Ovary clothed with stellate tomentum and silvery scales; styles 3, erect, $\frac{1}{10}$ in. long, 2-fid to about ½ way down, stellately tomentose outside. Capsules ¼ in. in diam., clothed with stellate tomentum and silvery scales. Seeds roughly tuberculate. Fl. B. I. v. 5, p. 409; Boiss. Fl. Orient. v. 4, p. 1141; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371. *Croton oblongifolium*, Delile, Fl. Egypt. p. 139, t. 51, fig. 1.

SIND: *Stocks!*

There is but 1 imperfect sheet in Herb. Kew. from the Bombay Presidency marked as above, while there is only one other sheet from India in Herb. Kew., which is from Ferozepur in the Panjáb.—DISTRIB. Arabia, N. Africa.

3. **Chrozophora plicata,** *A. Juss. Tent. Euphorb.* (1824) p. 28. Annual erect hoary herb reaching 2 ft. high with a long straight slender tap-root; stem usually naked in the lower part, slightly branched above, stellately hairy. Leaves thick, pale, variable in shape and size, 2–4 by 1½–4 in., ovate to orbicular, sometimes obscurely 3-lobed, wrinkled, clothed on both sides with long stellate hairs, base truncate, cordate or cuneate; petioles 1–2 in. long. Flowers in pedunculate densely stellately hairy racemes; bracts linear, ⅛–⅙ in. long, stellately hairy. MALE FLOWERS: Calyx ⅛ in. long. Petals $\frac{1}{10}$ in. long, very thin, ovate-lanceolate. Stamens 15 in 2 whorls. FEMALE FLOWERS: Sepals $\frac{1}{12}$ by $\frac{1}{30}$ in., triangular, acute, hairy. Petals as the sepals but shorter and narrower, hairy. Styles $\frac{1}{10}$ in. long, slightly connate at the very base, 2-fid to rather less than ½ way down. Capsules ⅓ in. in diam., densely stellately hairy without silvery scales. Fl. B. I. v. 5, p. 409; Dalz. & Gibs. p. 232; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Prain, Beng. Pl. p. 944; Watt, Dict. Econ. Prod. v. 2, p. 620. *Croton plicatum*, Vahl, Symb. Bot. v. 1 (1790) p. 78; Grah. Cat. p. 182.—Flowers: Apr. VERN. *Suryavarti.*

DECCAN: in rice-fields after the rains, *Graham, Dalzell & Gibson*; Poona, *Cooke!, Woodrow!* S. M. COUNTRY: Dharwar, *Cooke!* GUJARAT; *Dalzell & Gibson*; Ankleshvar, *Kanitkar!*; Baroda, *Woodrow.*—DISTRIB. Throughout India in the drier parts; westward to Spain and N. Africa.

A dye similar to that obtained from *C. tinctoria* may be obtained from this plant; the ashes of the root are given to children in coughs and the seeds are used as a purgative. See Watt, Dict. Econ. Prod. l. c.

4. **Chrozophora prostrata,** *Dalzell, in Dalz. & Gibs. Bo. Fl.* (1861) p. 233. A procumbent humifuse stellately woolly herb; branches numerous, spreading from the root, woolly-tomentose. Leaves ½–1¼ in. in diam., broadly ovate or orbicular, dark-colored, deeply bullate, finely

pubescent and with some stellate hairs above, densely stellately woolly beneath, base cordate or truncate. Flowers in short few-flowered axillary racemes; bracts linear, $\frac{1}{8}$–$\frac{1}{6}$ in. long. MALE FLOWERS: Calyx $\frac{1}{8}$ in. long. Petals elliptic-lanceolate, rather more than $\frac{1}{10}$ in. long. Stamens 15 in 2 whorls. FEMALE FLOWERS: Sepals $\frac{1}{10}$ by $\frac{1}{60}$ in., linear, acute. Petals linear, as the sepals but smaller and narrower. Styles $\frac{1}{10}$ in. long, slightly connate at the base, 2-fid to more than $\frac{1}{2}$ way down. Capsules $\frac{1}{4}$ in. in diam., stellately woolly without silvery scales. Fl. B. I. v. 5, p. 410.

DECCAN: in dried up water-holes common, *Dalzell & Gibson*; Alandi near Poona, *Cooke*!; Nasik, *Kanitkar*!; Poona, banks of the Mula River, *Cooke*!, *Kanitkar*!; Malegaon, *Bhiva*! S. M. COUNTRY: *Ritchie*, 1345! SIND: *Stocks*!—DISTRIB. Throughout India; N. Africa.

I think there are sufficient grounds for maintaining this as a separate species. It seems to be tolerably common in Egypt, where it has been collected by Schweinfurth (Nos. 137, 837, and 898 in Herb. Kew.), who considers it to be a species distinct from *C. plicata*, which also occurs in Egypt. The fact that this prostrate plant, as pointed out by Sir George Watt (Dict. Econ. Prod. v. 2, p. 621), does not furnish a dye, while the erect plant *C. plicata* does, goes far to show that they are different species.

25. **BALIOSPERMUM,** Blume.

Erect shrubs. Leaves alternate, sinuate-toothed or lobed, penninerved or 3–5-nerved from the base, 2-glandular at the base. Flowers small, monœcious or dicecious, paniculate or racemose. MALE FLOWERS globose; sepals 4–5, membranous, orbicular, concave, imbricate. Petals 0. Disk of 4–6 glands. Stamens 10–30; filaments slender, free; anthers terminal, the cells adnate throughout to the broad connective, dehiscing at first introrsely, the slits ultimately lateral. Pistillode 0. FEMALE FLOWERS: Sepals 5–6, lanceolate, entire or toothed, sometimes accrescent in fruit. Petals 0. Disk entire. Ovary 3-celled; ovule solitary in each cell; styles rather long, 2-fid or 2-partite; stigmas smooth (not fimbriate). Capsule of three 2-valved crustaceous cocci. Seeds ovoid; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. India and Malaya; species 6.

1. **Baliospermum axillare,** *Blume, Bijdr.* (1825) p. 604. A leafy stout usually monœcious undershrub 3–6 ft. high with herbaceous branches from the root, glabrous except the young shoots and sometimes the leaves beneath. Leaves sinuate-toothed, the upper small, lanceolate, penninerved, the lower large, reaching 6–12 in. long and often as broad, ovate, often palmately 3–5-lobed, base rounded or cuneate, 2-glandular; petioles 2–6 in. long; stipules of 2 glands. Flowers in numerous axillary racemes or contracted panicles, all male or with a few females below. MALE FLOWERS: Calyx globose, $\frac{1}{10}$ in. long, 4-5-partite, glabrous or slightly pubescent; segments suborbicular, concave, imbricate, membranous, finely mottled. Disk of 6 glands. Stamens about 20. FEMALE FLOWERS: Sepals ovate-lanceolate, pubescent, not accrescent in fruit. Disk $\frac{1}{10}$ in. in diam., thin, entire. Ovary hairy; styles about $\frac{1}{16}$ in. long, thick, 2-partite, dull-red, the stigmatic surface smooth, not fimbriate. Capsules $\frac{1}{3}$–$\frac{1}{2}$ in. long, obovoid, usually hairy, of three 2-valved crustaceous cocci. Seeds $\frac{1}{3}$ by $\frac{1}{5}$ in., ellipsoid, quite smooth, mottled. Fl. B. I. v. 5, p. 461; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 946. *Baliospermum polyandrum,*

Wight, Icon. t. 1885; Dalz. & Gibs. p. 232. *B. montanum*, Muell. Arg. in DC. Prodr. v. 15, part 2, p. 1125; Watt, Dict. Econ. Prod. v. 1, p. 364.—Flowers: Dec. VERN. *Dánti*; *Jamálgota*.

KONKAN: *Stocks*!, *Woodrow*!, *Dalzell*!, *Lambert*; Uran (Bombay harbour), *Stocks*!; Ratnágiri, *Stocks*!; Caranja Hills, *Dalzell & Gibson*.—DISTRIB. India (Behar, N. Bengal, Chota Nagpur, Assam, Birma, W. Peninsula); Malaya.

The seeds are used as a drastic purgative, one seed being the dose for an adult. The root is considered cathartic and is much employed in Hindu medicine. See Watt, Dict. Econ. Prod. l. c.

26. **CLAOXYLON,** A. Juss.

Evergreen trees or shrubs (rarely annual herbs). Leaves alternate, usually long-petiolate, oblong, entire or sinuate-toothed, usually penninerved. Flowers usually dicœcious (in the single Bombay species monœcious), small, in axillary or lateral spikes or racemes. MALE FLOWERS: Calyx subglobose, of 3–4 valvate segments. Petals 0. Disk 0. Stamens numerous (rarely few), inserted on or around a central receptacle, often intermixed with glands or long linear ciliate scales; filaments free; anthers erect, the cells connate at the base only but not confluent, free above and erect, dehiscing extrorsely. Pistillode 0. FEMALE FLOWERS: Calyx as in the male. Petals 0. Disk 0 or of 3 petal-like hypogynous scales alternate with the carpels. Ovary 3-celled; ovule solitary in each cell; styles short (rarely long), entire, fringed, spreading. Capsule of three 2-valved cocci, or indehiscent and coriaceous. Seeds subglobose, with or without an aril; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Tropics of the Old World; species about 40.

1. **Claoxylon Mercurialis,** *Thwaites Enum.* (1861) p. 271. Annual, erect, 8–24 in. high, glabrous or nearly so. Leaves numerous, spreading, 1–2 by ½–1 in., ovate-lanceolate, subacute, crenate-serrate, thin, glabrous, base rounded or acute; nerves 4–5 pairs, slender; petioles ⅓–¾ in. long, very slender. Flowers few, distant, in very slender racemes usually longer than the leaves, the female flowers usually solitary with several males. MALE FLOWERS: Sepals 3, broadly ovate, $\frac{1}{30}$ in. long. Stamens variable, usually 5–10. FEMALE FLOWERS: Sepals 3, broadly ovate, acute, $\frac{1}{16}$ in. long in fruit. Ovary pubescent; styles $\frac{1}{30}$ in. long, fringed, spreading. Capsules ⅛ in. in diam., of 3 subglobose almost distinct hairy cocci. Seeds globose, pale-brown, deeply foveolate. Fl. B. I. v. 5, p. 412; Trim. Fl. Ceyl. v. 4, p. 63; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 947. *Tragia Mercurialis*, Linn. Sp. Pl. (1753) p. 980; Grah. Cat. p. 186. *Micrococca Mercurialis*, Benth. in Hook. Niger Flora (1849) p. 503. *Microstachys Mercurialis*, Dalz. & Gibs. Bo. Fl. p. 227.—Flowers: July.

KANARA: *Law*!; Karwar, a common weed, *Talbot*! GUJARAT: Porbander, *Woodrow*.—DISTRIB. India (Behar, Birma, W. Peninsula); Ceylon, Arabia, Tropical Africa.

A weed usually in cultivated ground.

27. **ACALYPHA,** Linn.

Herbs shrubs or trees. Leaves alternate, toothed or crenate (rarely entire), penninerved or 3–5-nerved. Flowers usually monœcious, minute, in axillary or terminal racemes, or the females 1–2 in a

pedunculate solitary bract, or casually dicœcious; males very minute, ebracteate; females often at the base of large accrescent leafy bracts, low on the male spike or in separate spikes. Perianth simple. MALE FLOWERS: Sepals 4, valvate. Petals 0. Disk 0. Stamens usually 8, sometimes many on a convex receptacle; filaments short, free; anther-cells distinct, divaricate, often at length twisted or flexuous. Pistillode 0. FEMALE FLOWERS: Sepals 3–4, minute, imbricate. Petals 0. Disk 0. Ovary 3-celled; ovule solitary in each cell; styles filiform, often very long and laciniate or fimbriate. Capsules of 3 minute 2-valved crustaceous cocci. Seeds subglobose; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species 220, tropical and subtropical.

Female bracts solitary, very large, 2-flowered, entire	1. *A. Dalzellii.*
Female spikes with several toothed or fimbriate bracts.	
Bracts concealing the capsules.	
Bracts shortly dentate, truncate	2. *A. indica.*
Bracts 3-lobed	3. *A. brachystachya.*
Bracts fimbriate	4. *A. ciliata.*
Bracts not concealing the capsules.	
Bracts glabrous, bordered with gland-tipped hairs; capsules glabrous or nearly so	5. *A. malabarica.*
Bracts hairy, not bordered with gland-tipped hairs; capsules hispid with bulbous-based hairs	6. *A. lanceolata.*

1. **Acalypha Dalzellii,** *Hook. f. Fl. B. I.* v. 5 (1887) p. 414. Shrubby, glabrous, much branched; branches terete; bark brown. Leaves eglandular, membranous, $1\frac{3}{4}$–$2\frac{3}{4}$ by $\frac{7}{8}$–$1\frac{3}{8}$ in., ovate-lanceolate, subobtuse, obscurely crenate, glabrous, 3–5-nerved, base cuneate; petioles $\frac{3}{4}$–$1\frac{1}{4}$ in. long, very slender. MALE FLOWERS not seen. FEMALE FLOWERS in pairs in the axil of a solitary reniform quite entire bract $\frac{1}{4}$–$\frac{1}{2}$ in. in diam., on a long filiform peduncle reaching 1 in. long. Sepals lanceolate, ciliate. Ovary glabrous, 3–4-celled; styles pectinately laciniate. Fruit not seen.

Dalzell without locality in Herb. Kew.!

A very remarkable species of which there is but 1 specimen in Herb. Kew. from Dalzell's Bombay Herbarium, the flowers on which are all female. No locality has been assigned to the plant and the only reason for assuming it to be a native of Bombay is that the sheet came from Dalzell's *Bombay* Herbarium.

2. **Acalypha indica,** *Linn. Sp. Pl.* (1753) p. 1003. Annual erect herb 1–$2\frac{1}{2}$ ft. high; branches numerous, long, ascending, angular, finely pubescent. Leaves 1–3 by $\frac{3}{4}$–$1\frac{3}{4}$ in., ovate or rhomboid-ovate, acute or subobtuse, crenate-serrate, glabrous, thin, base cuneate, somewhat 3-nerved; petioles usually longer than the blade, slender; stipules minute. Flowers in numerous lax erect, elongate axillary spikes, the males minute, clustered near the summit of the spike, the females scattered, 3–5 surrounded by a shortly pedunculate large leafy truncate dentate cuneiform many-nerved bract $\frac{1}{4}$–$\frac{1}{3}$ in. in diam. Ovary hispid. Capsules small, hispid, quite concealed by the bract, often only 1-seeded. Seeds ovoid, smooth, pale-brown, $\frac{1}{20}$ in. long. Fl. B. I. v. 5, p. 416; Grah. Cat. p. 186; Dalz. & Gibs. p. 228; Wight, Icon. t. 877; Trim. Fl. Ceyl. v. 4, p. 58; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 947; Watt, Dict. Econ. Prod. v. 1, p. 62.—Flowers: June–Sept. VERN. *Kupi*; *Khokali.*

DECCAN: *Woodrow*; Poona districts, *Cooke*!; Dongergaon near Ahmednagar, *Cooke*! S. M. COUNTRY: Dharwar, *Woodrow*!—DISTRIB. Throughout India; Ceylon, Tropical Africa, Philippines.

The roots, leaves, and tender shoots are used in Hindu medicine. See Watt, Dict. Econ. Prod. l. c.

Nimmo (*fide* Graham) says that cats are as much affected by the roots of this plant as they are by those of Valerian.

3. **Acalypha brachystachya,** *Hornem. Hort. Hafn.* (1815) p. 909. Herbaceous, annual, 6–12 in. high, flaccid, glabrous or nearly so. Leaves thinly membranous, 1–3 by $\frac{5}{8}$–$1\frac{3}{4}$ in., ovate, acute or acuminate, crenate-serrate, with a few scattered hairs on both surfaces, base usually cordate, obscurely 7-nerved; petioles $\frac{3}{4}$–2 in. long, very slender. Flowers in short axillary androgynous spikes about $\frac{1}{2}$ in. long, the male flowers few in minute clusters at the top of the spike, the females crowded in 2–3-flowered bracts at its base; bracts of the female flowers green, very large, cut into 3 linear spreading entire 1-nerved obtuse lobes. Ovary hispid; styles pectinately laciniate, $\frac{1}{12}$ in. long. Capsules hispid, quite concealed by the large bracts. Seeds ovoid, $\frac{1}{16}$ in. long, reddish-brown, smooth or nearly so. Fl. B. I. v. 5, p. 416; Muell. Arg. in DC. Prodr. v. 15, part 2, p. 870; Trim. Fl. Ceyl. v. 4, p. 59; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Watt, Dict. Econ. Prod. v. 1, p. 61.—Flowers: Aug.

Rare in the Bombay Presidency. The only specimens I have seen from that Presidency were collected at Panchgani (4000 ft.) in the Deccan.—DISTRIB. India (temperate Himalaya, W. Peninsula); Ceylon, Java, Tropical Africa.

4. **Acalypha ciliata,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 162. Herbaceous, stout, 1–$2\frac{1}{2}$ ft. high; stems erect, not much branched, striate, the older glabrous, the younger pubescent. Leaves $1\frac{3}{4}$–3 by 1–$1\frac{1}{2}$ in., ovate, often caudate-acuminate, thin, finely serrate, hairy on the veins beneath, base usually rounded, 5-nerved; petioles usually exceeding the leaf-blade, spreading, slender. Flowers in axillary androgynous spikes $\frac{1}{2}$–$\frac{3}{4}$ in. long, the males few, sessile, very minute, at the top of the spike, the females several, crowded at its base; bracts of female flowers large (like the calyx of a Labiate, *Hooker*), 1–2-flowered, pale green, exceeding the capsules, with many nerves ending in long subulate hispid teeth. Capsules concealed by the bracts, quite glabrous, nearly white, twisted after dehiscence. Seeds globosely ovoid, $\frac{1}{16}$ in. long, smooth. Fl. B. I. v. 5, p. 417; Dalz. & Gibs. p. 228; Trim. Fl. Ceyl. v. 4, p. 59; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 947; Watt, Dict. Econ. Prod. v. 1, p. 62.—Flowers: Sept.

KONKAN: *Stocks*!, *Law*! DECCAN: Junnar (Poona districts), *Kanitkar*!, *Woodrow*. KANARA: *Law*!; Halyal (N. Kanara), *Woodrow*.—DISTRIB. India (Central Bengal, W. Peninsula); Ceylon, Arabia, Tropical Africa.

5. **Acalypha malabarica,** *Muell. Arg. in Linnæa*, v. 34 (1865) p. 42. A stout leafy somewhat flaccid branched annual 6–12 in. high; stem pubescent. Leaves rather rigid, 1–$1\frac{1}{2}$ by $\frac{1}{2}$–$\frac{3}{4}$ in., elliptic or elliptic-lanceolate, subacute, subserrate, base usually acute, 5-nerved; petioles shorter or longer than the leaf-blade, slender. Flowers in axillary androgynous spikes $\frac{1}{2}$ in. long, the males few, terminal, minute, the females numerous; bracts of females about $\frac{1}{5}$ in. in diam. when

spread out, nearly as long as the capsules, alternate, 2-5-flowered, glabrous, about 12-toothed, bordered with slender gland-tipped hairs. Capsules nearly glabrous. Seeds globosely ovoid, smooth, pale-brown. Fl. B. I. v. 5, p. 416.—Flowers: Aug.

KONKAN: *Stocks!*, *Law!* DECCAN: Poona, *Cooke!* KANARA: *Law!*, *Stocks!* GUJARAT: Surat, *Cooke!*—DISTRIB. India (W. Peninsula).

6. **Acalypha lanceolata,** *Willd. Sp. Pl.* v. 4 (1805) p. 524. Annual, 6–18 in. high, much branched from the base; branches clothed with long weak hairs. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ by $\frac{1}{4}$–$\frac{3}{4}$ in., ovate-lanceolate, subacute, serrate, slightly hairy especially on the nerves, base acute or rounded, 3-5-nerved; petioles $\frac{1}{2}$–1 in. long, slender, hairy. Flowers in short sessile axillary spikes, the male flowers in a minute head concealed by the uppermost bracts or produced into a small spike; bracts of female 1-flowered, $\frac{1}{8}$ in. across when spread out flat, with several deep acute teeth, hairy, not concealing the capsules. Ovary hispid; styles $\frac{1}{16}$ in. long, laciniate. Capsules longer than the bracts, hispid with hairs from glandular bases. Seeds ovoid, acute, $\frac{1}{16}$ in. long, smooth, pale yellowish-brown. Trim. Fl. Ceyl. v. 4, p. 59. *Acalypha fallax*, Muell. Arg. in Linnæa, v. 34 (1865) p. 43; Trim. Syst. Cat. p. 82; Hook. f. Fl. B. I. v. 5, p. 416; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372. *A. hispida*, Thw. Enum. p. 271 (*not* of Burm.). *A. Wightiana*, Muell. Arg. in Linnæa, v. 34 (1865) p. 43.—Flowers: Aug.

Rare in the Bombay Presidency. S. M. COUNTRY: Karlimatti, *Cooke!*; Badami, *Woodrow!*—DISTRIB. India (W. Peninsula, Birma); Ceylon, Sumatra, Java.

Acalypha Wilkesiana, Muell. Arg. in DC. Prodr. v. 15, part 2, p. 817. A shrub 6–10 ft. high, a native of the Fiji Islands, often grown in gardens for the sake of its highly ornamental leaves. Leaves large, reaching 8 in. long, ovate, acuminate, coarsely serrate, naturally bronze-colored, but under cultivation assuming a great variety of tints, pink yellow and brown, when the plant is very ornamental. There is a fine figure of the leaves in Seem. Fl. Vit. (1865) t. 58. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372 & Gard. in Ind. ed. 5, p. 434.

Numerous varieties of this plant are in cultivation, a common one being the variety *marginata* with large olive-brown leaves margined with rosy carmine.

Acalypha hispida, Burm. Fl. Ind. (1768) p. 303, t. 61, fig. 1 (*not* of Willd. nor Blume). A shrub, a native of New Guinea, sometimes grown in gardens. It has broadly ovate serrate cordate leaves and a very long pendulous female raceme 12–18 in. long, like a cat's tail, scarlet. Fl. B. I. v. 5, p. 417; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372. *Caturus spiciflorus*, Willd. Sp. Pl. v. 4 (1805) p. 714; Roxb. Fl. Ind. v. 3, p. 760.

28. **ADENOCHLÆNA,** Baill.

Trees or shrubs, glabrous or stellately tomentose. Leaves alternate, entire. Flowers monœcious, in terminal or axillary spiciform racemes, the males numerous, clustered, the females few at the base of the spikes.

Disk 0. MALE FLOWERS globose in bud. Sepals 4–6, valvate. Stamens 4–6 exserted; filaments free, round a columnar pistillode; anthers dorsifixed, versatile, the cells parallel, adnate to the thick connective. FEMALE FLOWERS: Sepals 5–8, narrow, unequal. Ovary 3-celled; ovule 1 in each cell; styles long, connate below, spreading and 2-fid above, with recurved plumose multifid arms. Capsule of three 2-valved cocci. Seeds estrophiolate, subglobose; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. India and Malaya; species 4 or 5.

1. **Adenochlœna indica,** *Bedd. Flor. Sylvat.* v. 2 (1872) t. 261 *in adnot.* A shrub or moderate-sized tree; young parts puberulous; bark white, smooth. Leaves subcoriaceous, 3–7 by $1\frac{1}{2}$–$3\frac{1}{2}$ in., elliptic, entire, more or less bluntly pointed, often mucronate, glabrous or nearly so, base shortly rounded or very narrowly cordate (rarely subacute); main nerves 6–8 pairs, prominent beneath, with reticulate venation between; petioles $\frac{1}{4}$–4 in. long, somewhat thickened at the top; stipules lanceolate. Flowers in lateral and terminal interrupted scurfily puberulous spikes 2–6 in. long, the males numerous, the females very few at the base of the spike; bracts minute. MALE FLOWERS: Buds globose $\frac{1}{10}$ in. in diam. Stamens 4–5, exserted. FEMALE FLOWERS: Sepals lanceolate, unequal, tomentose. Ovary tomentose; styles 3, united into a stout column at the base, free and spreading above, each divided into 2 arms which are again 2-fid, papillose. Capsules scabrous, $\frac{3}{4}$ in. in diam. Fl. B. I. v. 5, p. 418; Talb. Trees, Bomb. ed. 2, p. 314; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372. *Cephalocroton indicum*, Bedd. Flor. Sylvat. (1872) t. 261. *Symphyllia mallotiformis*, Muell. Arg. in Linnæa, v. 34 (1865) p. 156 & in DC. Prodr. v. 15, part 2, p. 764.—Flowers: Oct.–Dec.

Rare in the Bombay Presidency. KANARA: N. Kanara near the falls of Gairsoppa, *Talbot*, 276!—DISTRIB. India (W. Peninsula, but not on the Nilghiris), apparently endemic.

29. **TREWIA,** Linn.

Soft-wooded trees. Leaves opposite, broadly ovate or orbicular, entire; base cordate, 3–5-nerved. Flowers dicœcious, rather large, developed before the leaves, the males in lax lateral bracteate racemes one to each bract, the females long-pedunculate, solitary or racemose. Perianth simple. Petals 0. Disk 0. MALE FLOWERS: Calyx globose, splitting into 3–4 broad concave often reflexed segments. Stamens numerous, on a convex receptacle; filaments free; anthers dorsifixed, oblong, the cells parallel, contiguous. Pistillode 0. FEMALE FLOWERS: Sepals 3–5, broad, imbricate, caducous. Ovary 2–4-celled; ovule solitary in each cell; styles connate below, long, terete, entire, papillose throughout. Fruit 2–4-celled, indehiscent or dehiscing loculicidally; pericarp more or less fleshy; endocarp crustaceous. Seeds rounded on the back with flat or angular faces, smooth; testa hard; albumen fleshy; cotyledons broad, flat.—DISTRIB. India; Ceylon; species 2.

Female flowers solitary or 2–3 together; fruit globose, 1–$1\frac{1}{2}$ in. in diam., woody, indehiscent	1. *T. nudiflora.*
Female flowers numerous, in short racemes; fruit ovoid, $\frac{3}{8}$ in. long; pericarp thin, loculicidal	2. *T. polycarpa.*

1. **Trewia nudiflora,** *Linn. Sp. Pl.* (1753) p. 1193 (*Trevia*). A large deciduous tree; bark smooth, grey; wood white, soft; young shoots and sometimes leaves beneath and inflorescence clothed with cottony wool, at other times nearly glabrous. Leaves opposite, 3-7 by 2–5½ in., ovate, entire, acuminate, glabrous and bright green above, base cordate, 3–5-nerved; petioles 1–3 in. long; stipules minute, acute, soon falling. Flowers dioecious, the males in racemes 3–8 in. long, the females on long peduncles. MALE FLOWERS: Flowers ⅓–½ in. in diam. Sepals valvate, concave; pedicels slender, short, horizontal. Stamens numerous. FEMALE FLOWERS solitary or 2–3 together; peduncles reaching 4 in. long. Sepals 3–5, broad, imbricate, caducous. Ovary woolly; styles ½–¾ in. long, yellow. Fruit almost woody, globose, 1–1½ in. in diam., tomentose when young. Seeds rounded on the back, slightly angular on the face, smooth and polished, dark-brown. Fl. B. I. v. 5, p. 423; Grah. Cat. p. 185; Dalz. & Gibs. p. 231; Wight, Icon. t. 1870 (male flowers only); Bedd. Flor. Sylvat. t. 281 (male flowers only); Trim. Fl. Ceyl. v. 4, p. 61; Talb. Trees, Bomb. ed. 2, p. 314; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 948; Watt, Dict. Econ. Prod. v. 6, part 4, p. 76.—Flowers: Dec.-Mar. VERN. *Petári.*

KONKAN: in moist forests, often along the banks of rivers and streams, *Talbot*; Wari Country *Dalzell!*; Banda in the Wari Country, *Woodrow.*—DISTRIB. Throughout the hotter parts of India; Ceylon, Malacca, Sumatra, Java.

2. **Trewia polycarpa,** *Benth. in Gen. Pl.* v. 3 (1880) p. 318. A tree. Leaves subopposite 6–8 in. long and often as broad as long, broadly ovate, acuminate, glabrous or nearly so, reticulately veined, base cordate, 5-nerved; petioles 1½–3 in. long. Female racemes lateral, many-flowered, 2–3 in. long; pedicels short, stout. Ovary 2-celled; styles long, papillose all over. Fruit ⅜ in. long, globosely ovoid, densely tomentose; pericarp crustaceous, loculicidal. Seeds ⅓ by ⅕ in., rounded at both ends and on the back with a nearly flat face, smooth. Male flowers not seen; the specimens in Herb. Kew. are all female. Fl. B. I. v. 5, p. 424; Talb. Trees, Bomb. ed. 2, p. 315; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372. *Trewia nudiflora*, Wight, Icon. t. 1871 (the female flowers only); Bedd. Flor. Sylvat. t. 281 (the female flowers only).

KONKAN: *Stocks!*, *Law!*, *Talbot.*—DISTRIB. India (W. Peninsula), apparently endemic.

30. **MALLOTUS,** Lour.

Trees or shrubs. Leaves opposite or alternate, entire, toothed or 3-lobed, penninerved or 3–7-nerved, sometimes peltate often gland-dotted beneath and sometimes with glandular areas at the base above. Flowers dioecious or monoecious, small or minute, in axillary or terminal simple or branched spikes or racemes, the males fascicled, the females solitary in the bracts. Perianth simple. MALE FLOWERS: Calyx globose or ovoid, 3–5-partite; lobes valvate. Petals 0. Disk 0. Stamens numerous, crowded on a flat or convex receptacle; filaments free; anthers small, dorsifixed, the cells globose or shortly oblong, parallel, adnate to the wide connective, often discrete. Pistillode 0 or minute. FEMALE FLOWERS: Calyx spathaceous or valvately 3–6-lobed or

partite. Petals 0. Disk 0 or small. Ovary 2–4-celled; ovule 1 in each cell; styles free or connate below, spreading or recurved above, entire, plumose or papillose. Fruit a capsule of 2–3 (rarely 4) 2-valved tuberculate, echinate paleaceous or smooth cocci. Seeds ovoid, oblong or globose; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Tropics of the Old World; species about 70.

Trees; leaves mostly alternate.	
Capsules 3–4-coccous, clothed with long soft villous spines	1. *M. albus.*
Capsules 3-coccous, covered with a red resinous powder	2. *M. philippinensis.*
Erect shrubs; leaves opposite.	
Capsules 3-coccous, echinate with short stout conical spines	3. *M. stenanthus.*
Capsules 3–4-coccous, densely clothed with long slender villous filaments often $\frac{1}{8}$ in. long	4. *M. Lawii.*
A straggling or climbing shrub; leaves alternate; capsules 2-coccous, stellately fulvous-tomentose	5. *M. repandus.*

1. **Mallotus albus,** *Muell. Arg. in Linnæa,* v. 34 (1865) p. 188. A moderate-sized tree, sometimes reaching 50 ft. high; branchlets, petioles, underside of leaves and inflorescence densely clothed with grey or tawny stellate tomentum. Leaves 4–8 in. long and often as broad as long, very variable, mostly alternate, broadly ovate or orbicular or triangular-ovate, acuminate, entire or with shallow lobes, dark-green above, white-tomentose beneath, base narrowly peltate, rounded, truncate or shallowly cordate, 2-glandular, usually 5-nerved; petioles 3–8 in. long. Flowers dioecious, in axillary and terminal panicles, the males in distant clusters, the females shortly pedicellate, crowded. MALE FLOWERS: Buds globose, $\frac{1}{8}$ in. in diam. Sepals usually 4, elliptic-lanceolate, acute, $\frac{1}{6}$ in. long, scurfily tomentose. Stamens very numerous; filaments slender; anther-cells parallel. FEMALE FLOWERS: Calyx hemispheric, $\frac{1}{6}$ in. long, 4–5-lobed, the sepals rather thicker than in the male. Ovary densely clothed with stellate hairs; styles papillose, almost plumose. Capsules loculicidally 4-valved, $\frac{1}{2}$ in. in diam., globose, echinate with soft woolly spines, white-tomentose. Seeds $\frac{1}{5}$ by $\frac{1}{6}$ in., rounded on the back, angular on the face, nearly black. Fl. B. I. v. 5, p. 429; Trim. Fl. Ceyl. v. 4, p. 65; Talb. Trees, Bomb. ed. 2, p. 315; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 949; Watt, Dict. Econ. Prod. v. 5, p. 114. *Rottlera peltata,* Wight, Icon. v. 5 (1852) p. 21, t. 1873 (by error *fultata*). *R. mappoides,* Dalz. in Kew Journ. Bot. v. 3 (1851) p. 122; Dalz. & Gibs. p. 230.—Flowers: Sept.–Dec. This is the VAR. *occidentalis* of Hook. f. Fl. B. I. v. 5, p. 429.

KONKAN: moist forests, *Talbot.* S. M. COUNTRY: Párva Ghát, *Stocks*!, Castlerock, *Kanitkar*!, *Woodrow*; Daski, 3 miles from Castlerock, *Bhiva*! KANARA: moist forests, *Talbot*; Gatpraba River, *Dalzell*!, near Yellapur, *Talbot*, 42!; Talaveri, *Stocks*!—DISTRIB. India (W. Peninsula); Ceylon.

2. **Mallotus philippinensis,** *Muell. Arg. in Linnæa,* v. 34 (1865) p. 196. A small much-branched tree; branchlets, young leaves, and inflorescence tawny- or rusty-pubescent. Leaves alternate, variable, 3–6 by $1\frac{1}{4}$–3 in., ovate or ovate-lanceolate, acuminate, entire or slightly toothed, glabrous above, pubescent and with numerous orbicular red glands beneath, reticulately veined, base rounded or acute, strongly

3-nerved at the base and with 4–7 pairs of nerves above the basal ones; petioles 1–2 in. long, cylindric, fulvous-pubescent, with 2 small sessile glands one on each side of the summit. Flowers dicœcious, small; the males clustered, sessile or very shortly pedicellate, in erect terminal spikes which are usually several together and often longer than the leaves; the females sessile or nearly so, in short spikes. MALE FLOWERS: Sepals 4 (rarely 5), $\frac{1}{8}$ in. long, lanceolate, acute. Stamens numerous. Bracts $\frac{1}{16}$ in. long, broadly ovate, acute. Buds globosely ovoid. FEMALE FLOWERS: Calyx divided nearly to the base; sepals 3 or 4, thicker than in the male, ovate-lanceolate. Ovary with red glands, 3-celled; styles 3, simple, papillose. Capsules $\frac{1}{3}$–$\frac{1}{2}$ in. in diam., 3-lobed, loculicidally 3-valved, covered with a bright-red powder consisting of minute stellate hairs and fine grains of a red resinous substance soluble in alcohol and ether. Seeds $\frac{1}{6}$ in. in diam., subglobose, black. Fl. B. I. v. 5, p. 442; Bedd. Flor. Sylvat. t. 289; Trim. Fl. Ceyl. v. 4, p. 68; Talb. Trees, Bomb. ed. 2, p. 316; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 949; Watt, Dict. Econ. Prod. v. 5, p. 114. *Rottlera tinctoria*, Roxb. Cor. Pl. v. 2 (1798) p. 36, t. 167; Grah. Cat. p. 184; Dalz. & Gibs. p. 230.—Flowers: Nov.-Jan. VERN. *Shendri*; *Kamala*; *Ruhin*; *Kapilo*.

KONKAN: N.& S. Konkan, *Law*!; hills throughout the Konkans, *Graham*; Konkan jungles, *Dalzell & Gibson*; Campoli, *Bhiva*!; Ambeghât, *Cooke*! DECCAN: Mahableshwar, *Cooke*!, *Graham*; Nasik, *Bhiva*! GUJARAT: Balsar, *Kanitkar*! SIND: *Stocks*!—DISTRIB. Throughout Tropical India; Ceylon, Malay Islands, Australia, China.

The red powder which covers the seeds furnishes a valuable dye which is employed in dyeing silk a bright flame-colour. The powder is also used in medicine and is considered to be efficacious in the expulsion of Tænia or Tape-worm. (See Watt, Dict. Econ. Prod. l. c.)

3. **Mallotus stenanthus,** *Muell. Arg. in Linnœa*, v. 34 (1865) p. 191. A nearly glabrous shrub with yellow resinous glands on the young branchlets, inflorescence, and the underside of the leaves; branches red-brown; branchlets compressed. Leaves opposite, 3–6 by 1–1$\frac{3}{4}$ in., lanceolate, obtusely acuminate, entire or sinuate-toothed, glabrous, shining, dotted on the underside with numerous yellow resinous glands, penninerved, base narrowly rounded; nerves 5–7 pairs, prominent beneath, with reticulate venation between; petioles $\frac{1}{4}$–$\frac{3}{8}$ in. long. Flowers in slender axillary and terminal racemes $\frac{1}{2}$–2 in. long. MALE FLOWERS sessile or shortly pedicellate; buds ovoid. Calyx divided to the base. Sepals usually 4, lanceolate, $\frac{1}{10}$ in. long, clothed with yellow resinous glands. Bracts ovate, acute. Stamens about 20; filaments stout, $\frac{1}{16}$–$\frac{1}{12}$ in. long. FEMALE FLOWERS sessile or nearly so; buds oblong. Capsules $\frac{1}{3}$ in. in diam., tridymous, clothed with yellow resinous glands, echinate with short stout sparsely scattered conical spines. Seeds globose, smooth, $\frac{1}{6}$–$\frac{1}{5}$ in. in diam. There is a great dearth of female flowers in Herb. Kew. Fl. B. I. v. 5, p. 437; Bedd. For. Man. in Flor. Sylvat. p. ccix; Talb. Trees, Bomb. ed. 2, p. 316; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372.—Flowers: Sept.-Nov.

Dalzell without locality in Herb. Kew! KONKAN: *Stocks*!, *Law*! KANARA: Talaveri, *Ritchie*, 1256!; Yellapur, *Talbot*, 1039!—DISTRIB. India (W. Peninsula), apparently endemic.

4. **Mallotus Lawii,** *Muell. Arg. in Linnæa,* v. 34 (1865) p. 192. A small shrub; branchlets, petioles, and inflorescence pubescent. Leaves 4–8 by $1\frac{1}{2}$–$2\frac{3}{4}$ in., opposite, penninerved, elliptic-lanceolate, or oblong-lanceolate, or sometimes oblanceolate, obtuse, acuminate, repand-dentate, glabrous or nearly so, clothed beneath with minute yellow resinous glands, base usually acute; nerves 5–8 pairs with reticulate venation between; petioles $\frac{1}{8}$–$\frac{3}{8}$ in. long. Flowers in slender racemes shorter than the leaves. MALE FLOWERS numerous, in rather distant fascicles along the rhachis, sessile or shortly pedicellate; buds globose, shortly pointed. Sepals 3–4, broadly ovate, acute, villous, $\frac{1}{8}$–$\frac{1}{6}$ in. long. Stamens very numerous, 50 or more; filaments short. FEMALE FLOWERS: Racemes few-flowered; flowers pedicellate, 1 to each bract; bracts ovate, acute, $\frac{1}{12}$ in. long. Calyx spathaceous, $\frac{1}{4}$ in. long, splitting into about 6 lanceolate unequal villous segments. Styles shortly connate at the base, divided above into spreading plumose lobes. Capsules $\frac{3}{4}$ in. in diam., 3–4-coccous, densely clothed with long slender villous filaments which are sometimes $\frac{1}{8}$ in. long. Seeds subglobose, smooth, polished. Fl. B. I. v. 5, p. 438; Bedd. For. Man. in Flor. Sylvat. p. ccix; Talb. Trees, Bomb. ed. 2, p. 316; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372. *Mallotus aureo-punctatus,* Muell. Arg. in DC. Prodr. v. 15 (1864) p. 973; Bedd. For. Man. in Flor. Sylvat. p. ccix. *Rottlera aureo-punctata,* Dalz. in Kew Journ. Bot. v. 3 (1851) p. 122; Dalz. & Gibs. p. 230.—Flowers: Oct.–Jan.

KONKAN: *Stocks!, Law!*; Matheran, *Cooke!, Woodrow!, H. M. Birdwood*; Miradonger near Pen, *Dalzell!*; evergreen forests, *Talbot.* DECCAN: Khandala, *Woodrow!* S. M. COUNTRY: Londa, *Woodrow!* KANARA: N. Kanara, *Woodrow*; evergreen forests near the Devimana and Nilkund Ghâts, *Talbot.*—DISTRIB. India (W. Peninsula), apparently endemic.

5. **Mallotus repandus,** *Muell. Arg. in Linnæa,* v. 34 (1865) p. 197. A large straggling or climbing dicecious shrub; stem fluted, white, scaly, rough at the base, covered sparingly with large spines 1–3 in. long, single or 3–4 from a tubercle (*Talbot*); branchlets, petioles, underside of the leaves, and inflorescence with tawny stellate tomentum. Leaves alternate, 2–$3\frac{1}{2}$ by $1\frac{1}{2}$–3 in., broadly deltoid-ovate or rhomboid-ovate, acuminate, entire or sinuate-toothed, with pale scattered glands beneath, base truncate or cuneate, 3-nerved; petioles 1–$1\frac{1}{2}$ in. long. MALE FLOWERS pedicellate, in paniculate racemes 4–6 in. long; bracts $\frac{1}{10}$ in. long, linear-lanceolate, hairy; buds globosely ovoid, fulvous-pubescent. Calyx divided to the base; sepals 5, ovate, acute, deflexed, $\frac{1}{6}$–$\frac{1}{5}$ in. long. Stamens numerous, 50–60; filaments $\frac{1}{10}$ in. long, filiform; anther-cells of the inner stamens often quite separate, attached at different levels of the connective. FEMALE FLOWERS with rather long pedicels, in simple or branched racemes; bracts as in the male. Calyx not divided quite to the base; tube short, globose, about $\frac{1}{30}$ in. long; segments 4, linear-lanceolate, $\frac{1}{8}$ in. long. Styles 2, plumose, spreading, very shortly connate below. Capsules didymous, stellately fulvous-tomentose, $\frac{1}{2}$ in. across. Seeds globose, $\frac{1}{8}$–$\frac{1}{6}$ in. in diam., black. Fl. B. I. v. 5, p. 442; Bedd. For. Man. in Flor. Sylvat. p. ccx; Trim. Fl. Ceyl. v. 4, p. 67; Talb. Trees, Bomb. ed. 2, p. 316; Prain, Beng. Pl. p. 949. *Rottlera dicocca,* Roxb. Fl. Ind. v. 3, p. 829; Dalz. & Gibs. p. 230.—Flowers: Sept.–Oct.

KONKAN: S. Konkan, common, *Dalzell & Gibson, Talbot.* KANARA: *Law* !, *Stocks*!; evergreen forests near Yellapur, *Talbot.* DISTRIB. India (Bengal, Birma, Assam, W. Peninsula); Ceylon, China, Malaya, New Caledonia.

31. **CLEIDION,** Blume.

Glabrous trees. Leaves alternate, usually sinuate-toothed, penni-nerved. Flowers small, monœcious or dicœcious; males in long axillary racemes; females 1–2 on a long axillary peduncle. Perianth simple. MALE FLOWERS: Calyx globose, splitting into 3–4 valvate segments. Petals 0. Stamens numerous, in a globose mass on a convex or conical receptacle; filaments free; anthers dorsifixed and 4-celled or 2-celled, the cells transversely didymous on a broad connective. Pistillode 0. FEMALE FLOWERS: Sepals 3–5, imbricate. Petals 0. Ovary 2-3-celled; ovule 1 in each cell; styles 2-3-fid, connate below, the arms long, filiform. Capsule of 1–3 two-valved cocci. Seeds subglobose; testa coriaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species about 13, tropical.

1. **Cleidion javanicum,** *Blume, Bijdr.* (1825) p. 613. A glabrous evergreen middle-sized tree; bark grey, rough with a powdery surface of small raised corky cells (*Talbot*). Leaves alternate, coriaceous, 3-6 by 1½–2 in., elliptic-lanceolate, acuminate, serrate or subentire, glabrous, dark-green above, paler beneath, base acute; main nerves 5–7 pairs, conspicuous beneath; petioles 1–3 in. long, thickened at the top. MALE FLOWERS in long axillary racemes. Calyx globose, splitting into 3–4 valvate reflexed segments ⅛ in. long, thin, lanceolate, glabrous. Stamens many, on a conical receptacle: anthers 4-celled. FEMALE FLOWERS solitary on a long axillary peduncle 2–4 in. long. Sepals 3–5, short, thick, ovate. Styles 2, very long, each again divided into 2 spreading filiform arms. Capsules large, nearly 1 in. across, smooth, tipped with the persistent styles, 2-lobed, the lobes nearly globose, each splitting into 2 valves. Seeds ⅜ in. in diam., globular, grey mottled with brown. Fl. B. I. v. 5, p. 444; Bedd. Flor. Sylvat. t. 272; Trim. Fl. Ceyl. v. 4, p. 69; Talb. Trees, Bomb. ed. 2, p. 316; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 950; Watt, Dict. Econ. Prod. v. 2, p. 368. *Rottlera uranda,* Dalz. in Kew Journ. Bot. v. 3 (1851) p. 229; Dalz. & Gibs. p. 230.—Flowers: Oct.–Dec.

Dalzell without locality in Herb. Kew.! KONKAN: *Law*! DECCAN: Phonda Ghát, *Stocks*!, *Dalzell & Gibson.* KANARA: Yacombi (N. Kanara), *Kanitkar*!, *Woodrow*; Ainshi Ghát forests, *Talbot, Woodrow.*—DISTRIB. India (Assam, Chittagong, Birma, W. Peninsula); Ceylon, Java.

32. **MACARANGA,** Thouars.

Trees or shrubs. Leaves alternate, often large and peltate, entire or lobed, more or less glandular beneath, 3-many-nerved at the base. Flowers usually dicœcious, in axillary racemes or panicles; males many, clustered; females one or few to each bract; bracts often large, entire or toothed. Perianth simple. MALE FLOWERS minute. Calyx globose or obovoid; sepals 3–5, valvate. Petals 0. Disk 0. Stamens central, 1–3, oftener 20–30; filaments short, free; anthers terminal, short,

2-celled and 4-valved, or 3-celled and 3-valved. Pistillode 0. FEMALE FLOWERS: Calyx 2–4-lobed. Petals 0. Disk 0. Ovary 2–6 (rarely by abortion 1)-celled; ovule 1 in each cell; styles entire, short or long. Fruit a small capsule of 1–5 naked or echinate 2-valved cocci, often glandular or with a waxy coat. Seeds globose; testa crustaceous or bony; albumen fleshy; cotyledons broad, flat.—DISTRIB. Tropics of the Old World; species about 80.

1. **Macaranga tomentosa,** *Wight, Icon.* v. 5, part 2 (1852) p. 23 & in v. 6, t. 1949, fig. 1. A small or middle-sized tree; bark dark-grey; branchlets stout; young shoots tomentose. Leaves 5–8 by $3\frac{1}{4}$–$5\frac{1}{2}$ in., ovate or deltoid-ovate, or orbicular, cuspidate, broadly peltate, entire or minutely toothed, glabrous or nearly so above, more or less pubescent and closely gland-dotted beneath, base rounded; basal nerves numerous and with 6–8 pairs of strong nerves above the basal ones, with reticulate venation between; petioles 3–6 in. long; stipules ovate, acuminate, reflexed, caducous. MALE FLOWERS minute, $\frac{1}{60}$ in. in diam., numerous, in interrupted dense sessile heads, enveloped in bracts and bracteoles, arranged in numerous much-branched axillary rusty-tomentose panicles shorter or longer than the leaves; bracts broader than long, toothed, veined; bracteoles concave. Sepals 3, minute, obovate, cuneate. Stamens 2–3. FEMALE FLOWERS: Panicles simpler than in the male, the branches racemose with larger bracts. Calyx-limb obsolete. Ovary densely glandular, 1-celled; stigma sessile, often embracing one side of the ovary, thickly papillose. Capsules $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., globose, hairy and glandular. Seed globose; testa brown, crustaceous, rough. Bedd. Flor. Sylvat. t. 287; Trim. Fl. Ceyl. v. 4, p. 70. *Macaranga Roxburghii,* Wight, Icon. v. 5, part 2 (1852) p. 23 & in v. 6, t. 1949, fig. 4; Dalz. & Gibs. p. 228; Hook. f. Fl. B. I. v. 5, p. 448; Talb. Trees, Bomb. ed. 2, p. 317; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Watt, Dict. Econ. Prod. v. 5, p. 103. *M. peltata,* Muell. Arg. *in DC. Prodr.* v. 15 (1865) p. 1010; Bedd. For. Man. in Flor. Sylvat. p. ccxi; Prain, Beng. Pl. p. 951. *Osyris peltata,* Roxb. Fl. Ind. v. 3 (1832) p. 755; Grah. Cat. p. 177.—Flowers: Jan.–Mar. VERN. *Chánda; Chandáda.*

KONKAN: *Dalzell & Gibson*; moist forests, *Talbot*; Matheran, *Cooke*!, *H. M. Birdwood, Woodrow*! DECCAN: Khandala, *Graham, Cooke*!; Párghát, *Graham*; Thal Ghát, *Graham.*—DISTRIB. India (hills of Orissa and the Circars, W. Peninsula); Ceylon.

EXCLUDED SPECIES.

MACARANGA INDICA, Wight, Icon. v. 5, part 2 (1852) p. 23, t. 1883 & t. 1949, fig. 2. A large tree; branchlets very robust, glaucous; young shoots tawny-tomentose. Leaves 5–10 in. in diam., orbicular-ovate, acuminate, broadly peltate; petioles longer than the leaves. MALE FLOWERS in narrow fulvous-pubescent panicles; bracts minute, with a large glandular appendage. Sepals 2–3. Stamens 3–10. FEMALE FLOWERS: Panicles hairy. Sepals usually 4. Ovary 1–2-celled. Capsules small, $\frac{1}{8}$ in. in diam. Fl. B. I. v. 5, p. 446; Trim. Fl. Ceyl. v. 4, p. 70; Talb. Trees, Bomb. ed. 2, p. 317.

This is given in the 'Flora of British India' as occurring on the Western Ghâts, but it has not been found in the Bombay Presidency though occurring on the Nilghiris and other hills in the southern portion of the Peninsula. Talbot (*l. c.*) says that it does not to his knowledge occur in N. Kanara.

33. **HOMONOIA,** Lour.

Rigid shrubs. Leaves alternate, narrow and subentire, or short and toothed, glandular-lepidote. Flowers usually dicœcious, in many or few-flowered axillary spikes or from the old wood. Perianth simple. MALE FLOWERS; Calyx globose, splitting into 3 valvate segments. Petals 0. Disk 0. Stamens many, in a dense globose cluster of repeatedly branching filaments; anthers with subglobose cells, sessile on the filament-branches, divaricate, the connective obscure. Pistillode 0. FEMALE FLOWERS: Sepals 5–8, narrow, imbricate, unequal, Petals 0. Disk 0. Ovary 3-celled; ovule 1 in each cell; styles entire or slightly connate at the base, spreading. Capsule small, of three smooth 2-valved cocci. Seeds rounded on the back, slightly angular on the inner face; testa crustaceous, hard, with a thin fleshy coat; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species 3 or 4 Indian and Malayan.

Leaves linear-oblong; spikes long, slender ..... 1. *H. riparia.*
Leaves obovate; spikes short, stout ..... 2. *H. retusa.*

1. **Homonoia riparia,** *Lour. Fl. Cochinch.* (1790) p. 637. A rigid evergreen willow-like shrub; branchlets, young leaves and inflorescence pubescent. Leaves numerous, erect, all closely set, 3–6 by $\frac{3}{8}$–$\frac{3}{4}$ in., linear-oblong or linear-lanceolate, acute, apiculate, entire or more or less toothed, glabrous above, clothed beneath with scattered and numerous minute orbicular scales, base acute or rounded; main nerves numerous, 10–30 pairs with reticulate venation between; petioles $\frac{1}{8}$–$\frac{3}{8}$ in. long; stipules $\frac{1}{6}$ in. long, linear-lanceolate, acute. Flowers dicœcious, sessile, in axillary bracteate spikes 2–5 in. long; rhachis pubescent; bracts ovate, acuminate, pubescent, $\frac{1}{12}$ in. long. MALE FLOWERS: Sepals 3, broadly elliptic, acute, concave, veined, glabrous, $\frac{1}{8}$ in. long. Stamens very numerous, in globose heads; anthers red. FEMALE FLOWERS: Sepals usually 5, narrowly ovate, acuminate, $\frac{1}{10}$ in. long. Ovary pubescent; styles 3, shortly connate at the base, nearly $\frac{1}{4}$ in. long, papillose. Capsules globose, $\frac{1}{3}$ in. in diam., tomentose. Seeds $\frac{1}{16}$ in. long, rounded on the back, slightly angular on the inner face, smooth, yellowish-brown. Fl. B. I. v. 5, p. 455; Bedd. For. Man. in Flor. Sylvat. p. ccxii; Trim. Fl. Ceyl. v. 4, p. 72; Talb. Trees, Bomb. ed. 2, p. 318; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 951; Watt, Dict. Econ. Prod. v. 4, p. 263. *Adelia neriifolia,* Roth, Nov. Pl. Sp. p. 375; Grah. Cat. p. 185; Dalz. & Gibs. p. 231; Wight, Icon. t. 1868.—Flowers: Jan.–Apr. VERN. *Serni.*

KONKAN: in river beds, *Law!, Talbot*; Ambeghát, *Woodrow.* DECCAN: Koina river, *Cooke!*; beds of streams in the ravines of Mahableshwar, *Cooke!* S. M. COUNTRY: Rámghát, *Ritchie,* 679! KANARA: *Talbot*; Karwar, *Woodrow*; Kála naddi, *Ritchie,* 679!—DISTRIB. India (Assam, N. Bengal, Birma, Central Provinces, W. Peninsula); Ceylon, Cochinchina, Java.

2. **Homonoia retusa,** *Muell. Arg. in Linnæa,* v. 34 (1865) p. 200. A small rigid glabrous shrub 2–4 ft. high; branches stout, woody. Leaves 1–2 by $\frac{1}{2}$–$\frac{3}{4}$ in., sessile or nearly so, rigidly coriaceous, obovate or cuneate-obovate, or oblanceolate, toothed towards the top, glabrous above, sparsely glandular beneath; nerves 6–10 pairs. Flowers sessile in short stout spikes $\frac{1}{4}$–1 in. long; rhachis glabrous; bracts ovate,

acute, pubescent, $\frac{1}{16}$–$\frac{1}{12}$ in. long. MALE FLOWERS: Sepals 3, broadly elliptic, concave, glabrous, often apiculate, $\frac{1}{8}$ in. long. FEMALE FLOWERS: Sepals narrow, ovate-lanceolate, acute, $\frac{1}{10}$ in. long, pubescent. Styles $\frac{1}{16}$ in. long, plumose. Capsules $\frac{1}{8}$ in. in diam., globose, hoary. Seeds $\frac{1}{16}$ in. long, rounded on the back, slightly angular on the inner face, yellow. Fl. B. I. v. 5, p. 456; Bedd. For. Man. in Flor. Sylvat. p. ccxii; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372. *Adelia retusa*, Grah. Cat. Pl. Bo. (1839) p. 185; Dalz. & Gibs. p. 231.—Flowers: Apr. VERN. *Machim.*

Dalzell without locality in Herb. Kew! KONKAN: *Stocks*!, *Lambert*! DECCAN: in river-beds, *Woodrow*; Mula River, Kirkee, *Cooke*!, *Kanitkar*! KANARA: *Law*; Supa (N. Kanara), *Talbot*!—DISTRIB. India (W. Peninsula), apparently endemic.

34. TRAGIA.

Perennial, usually twining or climbing herbs, hispid with stinging hairs. Leaves alternate, simple or palmately 3-lobed, serrate, 3–5-nerved at the base. Flowers monœcious, in terminal and leaf-opposed androgynous racemes, the males uppermost in the raceme the females below, few. Perianth simple. MALE FLOWERS: Calyx globose or obovoid, valvately 3–5-partite. Petals 0. Disk 0 or obscure. Stamens 1–3 (rarely many); filaments free or connate; anthers ovate or oblong, the cells contiguous, parallel. Pistillode minute, 3-fid or 0. FEMALE FLOWERS: Sepals 6, imbricate, entire or pinnatifid, often enlarged hardened and stellately spreading in fruit. Petals 0. Disk 0. Ovary 3-celled; ovule 1 in each cell; styles united in a column at the base, free, spreading and entire above. Fruit a capsule of three 2-valved cocci; endocarp crustaceous. Seeds globose; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species about 50, chiefly tropical.

A twining herb; leaves simple; styles circinately revolute ... 1. *T. involucrata.*
An erect or sometimes climbing herb; leaves palmately 3-partite; styles slightly spreading, not revolute ..... 2. *T. cannabina.*

1. **Tragia involucrata,** *Linn. Sp. Pl.* (1753) p. 980. A perennial more or less hispid herb, with scattered stinging hairs; stems elongate, slender, twining. Leaves 1–4 by $\frac{3}{4}$–2 in., variable, oblong-lanceolate to broadly ovate, acuminate, serrate, hairy, base rounded or cordate; petioles $\frac{1}{8}$–$\frac{5}{8}$ in. long; stipules $\frac{1}{4}$ in. long, ovate, acute, somewhat auricled at the base. Flowers shortly pedicellate, in terminal axillary and leaf-opposed usually hairy racemes 1–2 in. long, the males in the upper part, yellowish, the females few (rarely many) in the lower part of the raceme; bracts $\frac{1}{10}$ in. long, lanceolate, acute. MALE FLOWERS: Sepals 3, broadly elliptic or orbicular, concave, $\frac{1}{16}$ in. long, glabrous. Stamens 3. Pistillode small, 3-fid. FEMALE FLOWERS: Sepals 6, ovate, pinnatifid, very hispid, $\frac{1}{8}$ in. long, much elongating and becoming rigid in fruit. Ovary 3-lobed, hispid; styles 3, circinately revolute, united below in a stout cylindric column often as long as the branches. Capsules $\frac{1}{3}$ in. in diam., 3-lobed, white, more or less hispid. Seeds globose, smooth. Fl. B. I. v. 5, p. 465; Grah. Cat. p. 186; Dalz. & Gibs. p. 228; Trim. Fl. Ceyl. v. 4, p. 61; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 952; Watt, Dict. Econ.

Prod. v. 6, part 4, p. 71.—Flowers: Nov.-Dec. VERN. *Kolti*; *Khá-jakolti*.

Throughout the Presidency in the hills. KONKAN: Matheran, *Cooke*!, *H. M. Birdwood*. DECCAN: Panchgani, *Macnaghten*!; Mahableshwar, *Cooke*!; Khandala, *Nene*! S. M. COUNTRY: Castlerock, *Cooke*!—DISTRIB. Throughout India; Ceylon, China.

2. **Tragia cannabina,** *Linn. f. Suppl.* (1781), p. 415. Shrubby erect or climbing amongst bushes, not twining, 4–5 feet high, more or less hispid and with stinging hairs; stems stout, terete, woody. Leaves palmately 3-partite, reaching 3½ in. long; lobes toothed or pinnatifid, the middle lobe much longer than the lateral ones. Racemes as in the last species; bracts $\frac{1}{10}$–$\frac{1}{8}$ in. long, lanceolate, acute. MALE FLOWERS as in the last species. FEMALE FLOWERS: Calyx as in the last species. Styles 3, slightly spreading, but not revolute as in *T. involucrata*. Capsules $\frac{3}{8}$ in. across, 3-lobed, hirsute; lobes globose. Seeds globose, smooth, $\frac{1}{5}$ in. in diam. Dalz. & Gibs. p. 228; Juss. Tent. Euphorb. t. 15, 49 B. *Tragia involucrata*, var. *cannabina*, Muell. Arg. in DC. Prodr. v. 15, part 2, p. 944; Hook. f. Fl. B. I. v. 5, p. 465.—Flowers: May–June.

The styles are well shown in Jussieu's figure *l. c.*

KONKAN: *Stocks*! *Lambert*! DECCAN: Dhairi near Kadakvasla (Poona districts), *Kanitkar*!, Khandesh, *Woodrow*!, Poona districts, *Cooke*!; Junnar (Poona districts) *Kanitkar*! GUJARAT; in hedges, *Dalzell & Gibson*.—DISTRIB. India (Gangetic Plain, W. Peninsula); Ceylon.

I think that the habit, the shape of the leaves and the non-revolute styles constitute sufficient points of difference to justify the restoration of this plant to the rank of a species.

35. **SAPIUM,** P. Br.

Trees and shrubs. Leaves alternate, entire, serrate or toothed, penninerved; petiole often 2-glandular at the apex. Flowers monœcious, in terminal simple or branched spikes or racemes, the males above, several in each bract, the females in the lower part of the spikes or in separate spikes, solitary in the bracts. MALE FLOWERS: Calyx membranous, shortly 2–3-lobed or toothed, or splitting to the base into 2–3 valvate segments. Petals 0. Disk 0. Stamens 2 or 3; filaments free; anther-cells ovoid, distinct, contiguous, parallel. Pistillode 0. FEMALE FLOWERS: Calyx 3-fid or 3-partite. Petals 0. Disk 0. Ovary 2–3-celled; ovule 1 in each cell; styles free or connate at the base, spreading and recurved, entire. Fruit a crustaceous capsule, fleshy or pulpy, rarely woody, ultimately loculicidally 3-valved. Seeds globose, or ovoid, estrophiolate, usually long-persistent on the columella; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species 25, all tropical.

1. **Sapium insigne,** *Trim. Syst. Cat. Ceyl. Pl.* (1885) p. 83. A middle-sized glabrous deciduous tree, with a thick milky poisonous juice, thick branches and bright green foliage. Leaves crowded towards the ends of the branches, 5–10 by 2–3¼ in., elliptic-lanceolate or oblong-lanceolate, acuminate, crenate-serrate, often with a few glands on the margin, glabrous, base acute, sometimes unequal-sided; main nerves 10–16 pairs, slender; petioles 1–1¾ in. long, with 2 conspicuous glands

at the apex. Flowers appearing when the tree is bare of leaves, monœcious, in unisexual robust spikes 3–8 in. long, the males sessile, the females sessile or very shortly pedicellate, the female spikes much thickened in fruit. MALE FLOWERS in round clusters $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., the central flower opening first. Sepals 2, orbicular, concave, $\frac{1}{16}$ in. in diam. Stamens 2; filaments very short. FEMALE FLOWERS: Sepals ovate, acuminate, $\frac{1}{16}$ in. long. Ovary ovoid, glabrous; styles 3, short, spreading, shortly connate at the base. Capsules $\frac{1}{3}$ in. in diam., 2–3-celled, globosely ovoid, fleshy at first (purple, *Graham*), dry and irregularly dehiscent when ripe, packed closely together along the rhachis. Seeds $\frac{1}{4}$ in. long and broad, ovoid, somewhat compressed, smooth, pale. Fl. B. I. v. 5, p. 471; Trim. Fl. Ceyl. v. 4, p. 76; Talb. Trees, Bomb. ed. 2, p. 319; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 373; Prain, Beng. Pl. p. 954; Watt, Dict. Econ. Prod. v. 6, part 2, p. 471. *Sapium baccatum*, Grah. Cat. p. 181 (*not* of Roxb.). *Falconeria malabarica*, Wight, Icon. t. 1866. *Excœcaria insignis*, Muell. Arg. in DC. Prodr. v. 15 (1866) p. 1212; Bedd. For. Man. in Flor. Sylvat. (1873) p. ccxiv & Anal. Gen. t. 22. fig. 5 (bis).—Flowers: Dec.–Feb. VERN. *Ura; Dudla.*

Common near the coast of the Konkan and N. Kanara on dry rocky soil, usually on laterite, also in moist forests near the Ghâts, *Talbot.* Sparingly on the hills from Nasik to Vingorla, *Dalzell & Gibson.* KONKAN: Ratnagiri, *Dalzell!* DECCAN: Lanoli, *Woodrow*; Khandala, *Wight!*; Phonda Ghât, *Ritchie* 1334!—DISTRIB. India (Sub-himalayas, Assam, Chittagong, W. Peninsula); Ceylon.

Sapium sebiferum, Roxb. Fl. Ind. v. 3 (1832) p. 693). A small glabrous tree a native of China, known as the *Chinese Tallow Tree*, occasionally cultivated in gardens. Leaves rhomboid, entire, on long slender petioles. Flowers in terminal spiciform racemes. Ovary glabrous; styles 3, long, spreading, recurved. Capsule coriaceous, subglobose, shortly pointed. Seeds enclosed in a thick layer of a white fatty substance (*vegetable tallow*) attached to a central column which splits into 3 slender divisions. Fl. B. I. v. 5, p. 470; Grah. Cat. p. 181; Dalz. & Gibs. Suppl. p. 77; Trim. Fl. Ceyl. v. 4, p. 76; Talb. Trees, Bomb. ed. 2, p. 319; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 373; Prain, Beng. Pl. p. 954; Watt, Dict. Econ. Prodr. v. 6, part 2, p. 472.—Flowers: June. VERN. *Pipalyank.*

Sapium indicum, Willd. Sp. Pl. v. 4 (1805) p. 572. An evergreen glabrous tree 20–25 feet high, occasionally planted but not indigenous in the Bombay Presidency. Leaves elliptic-lanceolate, serrate, 3–5 in. long. Racemes spiciform, solitary; male flowers clustered, subsessile: female flowers larger, pedicellate. Fruit 1 in. in diam., glabrous, woody when ripe. Fl. B. I. v. 5, p. 471; Grah. Cat. p. 181; Wight, Icon. t. 1950; Talb. Trees, Bomb. ed. 2, p. 319; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 373; Prain, Beng. Pl. p. 954; Watt, Dict. Econ. Prod. v. 6, part 2, p. 471.

Graham (*l. c.*) states on the authority of Nimmo that this tree is to be found in various parts of the S. Konkan. It has not been found wild by any other collectors, and Talbot (*l. c.*) is of opinion that the tree is not found in the Bombay Presidency.

36. EXCŒCARIA, Linn.

Glabrous trees or shrubs with acrid milky juice. Leaves alternate or opposite, entire or subserrate. Flowers dicœcious or monœcious, in lateral axillary or terminal 1-sexual or androgynous racemes or spikes; males 1–3 in each bract, 2-bracteolate; females at the base of the raceme or in separate racemes; rhachis with large glands beneath or at the side of the bracts. Perianth simple. MALE FLOWERS: Sepals 3, small, subequal. Petals 0. Disk 0. Stamens 3; filaments free; anthers didymous, the cells globose, distinct, contiguous, parallel. Pistillode 0. FEMALE FLOWERS: Calyx 3-fid or 3-partite. Petals 0. Disk 0. Ovary 3-celled; ovule 1 in each cell; styles stout, shortly connate below, spreading and recurved above, entire. Fruit a 3-coccous capsule, the cocci separating from the columella with elastically-twisted valves. Seeds subglobose or 3-gonous, estrophiolate; testa crustaceous; albumen fleshy; cotyledons broad, flat.—DISTRIB. Tropical Asia, Africa, and Australia; species about 30.

Leaves alternate, elliptic	1. *E. Agallocha.*
Leaves opposite, linear-oblong	2. *E. robusta.*

1. **Excœcaria Agallocha,** *Linn. Syst. Nat.* ed. 10 (1759) p. 1288. A small poisonous evergreen tree with white highly acrid juice. Leaves alternate, thickly coriaceous, 2–4 by $1\frac{1}{4}$–2 in., elliptic, acuminate, entire or shallowly sinuate-crenate, base acute; petioles $\frac{1}{2}$–$1\frac{1}{4}$ in. long. Flowers minute, fragrant, yellowish-green; bracts rounded, fleshy. MALE FLOWERS sessile, in numerous catkin-like spikes 1–2 in. long; bracts with 1 flower and several minute bracteoles. Sepals minute, unequal, subserrulate. Stamens long, exserted. FEMALE FLOWERS pedicellate. Racemes few, $\frac{1}{2}$–1 in. long, the upper flowers usually imperfect. Sepals broadly ovate, acute, subserrulate. Styles free nearly to the base. Capsules very variable in size, $\frac{1}{4}$–1 in. in diam. Seeds subglobose, smooth. Fl. B. I. v. 5, p. 472; Grah. Cat. p. 185; Dalz. & Gibs. p. 227; Bedd. For. Man. in Flor. Sylvat. p. ccxv; Wight, Icon. t. 1865 B; Hook. Comp. Bot. Mag. v. 2 (1836) p. 306, t. 30; Trim. Fl. Ceyl. v. 4, p. 77; Talb. Trees, Bomb. ed. 2, p. 320; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 373; Prain, Beng. Pl. p. 955; Watt, Dict. Econ. Prodr. v. 3, p. 306. *Excœcaria Camettia,* Willd. Sp. Pl. v. 4, p. 864; Grah. Cat. p. 185.—Flowers: July–Aug. VERN. *Geva; Surund; Phungali.*

In tidal marshes along the coasts of the Presidency. KONKAN: *Stocks!* KANARA: Kumpta, *Woodrow!*—DISTRIB. India (Sundribans, Birma, W. Peninsula); Ceylon, Indian Archipelago, N. Australia, New Caledonia.

The tree is sometimes called *The Blinding Tree.* The juice is extremely acrid, producing blisters on the skin. It hardens into a kind of a black caoutchouc.

2. **Excœcaria robusta,** *Hook. f. Fl. B. I.* v. 5 (1888) p. 474. A shrub; branches stout, as thick as a goose-quill. Leaves opposite, coriaceous, 5–8 by $1\frac{1}{2}$–$2\frac{1}{2}$ in., linear-oblong, acuminate, entire or sinuate-subserrate, base acute; main nerves 15–20 pairs, spreading, slender; petioles $\frac{1}{2}$–$\frac{2}{3}$ in. long, stout, eglandular. Flowers in axillary 1-sexual robust spikes. MALE FLOWERS: Spikes solitary, 4–5 in. long; rhachis very stout; bracts small, broad, fleshy; bracteoles large, embracing the unexpanded flower. Sepals 3, membranous, with a broad cordate base,

unequal, orbicular, irregularly toothed, the point of insertion small. FEMALE FLOWERS not seen. Fruit immature $\frac{2}{3}$ in. in diam., on a very short axillary raceme, 3-lobed, truncate at top; pedicels short, stout; style short, persistent. Talb. Trees, Bomb. ed. 2, p. 320; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 373.

The occurrence of this shrub in the Bombay Presidency is doubtful. There is but one sheet from the Presidency in Herb. Kew. ticketed "*Konkan Stocks*," but the handwriting on the ticket is not that of Stocks. No other collectors seem to have found the plant in Bombay. There are 3 other sheets in Herb. Kew. from Kurg. None of the specimens have female flowers.

Excœcaria bicolor, Hassk. Retzia (1855) p. 158. A handsome shrub 4–5 ft. high, with ovate-lanceolate opposite leaves olive-green above, crimson beneath, bearing minute flowers in the cold season, is often cultivated as an ornamental shrub in gardens. Woodr. Gard. in Ind. ed. 5, p. 444.

37. **SEBASTIANA,** Spreng.

Shrubs rarely herbs. Leaves alternate, penninerved. Flowers monœcious, in terminal, axillary, and lateral slender racemes; males minute, 1–3 in each bract; females solitary or at the base of the raceme. MALE FLOWERS: Calyx minute, membranous, unequally 5-lobed or 5-partite. Petals 0. Disk 0. Stamens 2–4; filaments short, free or nearly so; anther-cells contiguous but distinct, parallel. Pistillode 0. FEMALE FLOWERS: Calyx 3-lobed or 3-partite. Petals 0. Disk 0. Ovary exserted, 3-celled; ovule 1 in each cell; styles free or connate at the base, entire, revolute or spreading. Capsule globose, of 3 cocci separating from a columella; endocarp crustaceous. Seeds oblong or subglobose, strophiolate; testa smooth; albumen fleshy; cotyledons broad, flat.—DISTRIB. Species 40, almost all American.

1. **Sebastiana Chamælea,** *Muell. Arg. in DC. Prodr.* v. 15, part 2 (1866) p. 1175. An annular glabrous herb 1–2 ft. high; stems numerous from a long thin tap-root, ascending, slender, grooved, ribbed or terete. Leaves $\frac{3}{4}$–3 by $\frac{1}{6}$–$\frac{1}{2}$ in., linear or narrowly oblong-elliptic, obtuse, finely serrulate, base tapering; midnerve strong, prominent beneath; petioles $\frac{1}{12}$–$\frac{1}{8}$ in. long; stipules ovate, acute, ciliate. Flowers yellowish. MALE FLOWERS in axillary or leaf-opposed slender short spikes; bracts very small, acute, with a large often stipitate gland on each side, 1–2-flowered. Calyx minute, membranous, not covering the stamens in bud; lobes 5, ovate, acute, ciliate. Stamens usually 3; filaments distinct. FEMALE FLOWERS usually solitary at the base of the male, or lateral on the branches without any males. Sepals 3, larger than in the male, obovate, acute, lacerate and ciliate, 2-glandular within. Ovary much exserted; styles 3, small, undivided. Capsules $\frac{1}{4}$–$\frac{1}{3}$ in. long, crustaceous, subglobosely oblong, 3-coccous, the cocci with 2 rows of spinules on the back of each, separating from a persistent columella, glabrous except for the spinules. Seeds $\frac{1}{8}$ in. long, ellipsoid-oblong, rounded at both ends, yellow. Fl. B. I. v. 5, p. 475; Trim. Fl. Ceylon, v. 4, p. 78; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 373; Prain, Beng. Pl. p. 955. *Microstachys Chamælea*, A. Juss. Tent.

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Euphorb. p. 49; Dalz. & Gibs. p. 228. *Tragia Chamælea*, Linn. Sp. Pl. (1753) p. 981; Grah. Cat. p. 186.—Flowers: Sept.-Dec. VERN. *Bhui-erandi.*

KONKAN: *Stocks*!, *Dalzell*!; Bombay, *Dr. Crespigny*!; Vingorla, *Dalzell & Gibson*, *Woodrow*; Ratnagiri, *Woodrow*, *Kanitkar*!; Marmagâo, *Cooke*!—DISTRIB. India (Behar, Chota Nagpur, Birma, W. Peninsula); Ceylon, China, Malay Islands, Tropical Australia and Africa.

The following plants not belonging to any of the foregoing genera are more or less commonly grown throughout the Presidency:—

Pedilanthus tithymaloides, Poit. in Ann. Mus. Par. v. 19 (1812) p. 390, t. 19. A succulent shrub about 3 ft. high, a native of S. America, with fleshy leaves and a scarlet slipper-shaped involucre, commonly used for borders of walks in gardens. Fl. B. I. v. 5, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 368, & Gard. in Ind. ed. 5, p. 444; Prain, Beng. Pl. p. 925. *Euphorbia tithymaloides*, Linn. Sp. Pl. (1753) p. 453; Dalz. & Gibs. Suppl. p. 76.—Flowers: Jan. VERN. *Vilayti-sher.*

Synadenium Grantii, Hook. f. Bot. Mag. (1867) t. 5633. An erect bush 6–10 ft. high with a stout terete green stem and few thick erect branches. Leaves scattered, 3–4 in. long, obovate-spathulate. Involucre ¼ in. in diam., consisting of an annular tomentose red-purple cushion, on the inner margin of which are 5 broadly oblong pubescent toothed erect scales. A native of Tropical Africa, sometimes grown in gardens. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 369. —Flowers: Nov.-Feb.

Aleurites moluccana, Willd. Sp. Pl. v. 4 (1805) p. 590. A handsome evergreen tree 40–60 ft. high, a native of the Pacific Islands. Leaves polymorphous, crowded at the ends of the branches. Flowers white, with short pedicels. Fruit 2–2½ in. in diam., subglobose, fleshy, smooth, olive-colored, containing 1 or 2 hard albuminous oily seeds with a furrowed testa. The seeds are eaten and contain a large quantity of oil which is used in cookery and for burning as well as in medicine. The tree is known as the *Bengal Walnut* or *Candle-nut Tree*. It grows well about Belgaum. Fl. B. I. v. 5, p. 384; Bedd. Flor. Sylvat. t. 276; Talb. Trees, Bomb. ed. 2, p. 310; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371; Prain, Beng. Pl. p. 942; Watt, Dict. Econ. Prod. v. 1, p. 163. *Aleurites triloba*, Forst. Charact. Gen. (1776) p. 112; Grah. Cat. p. 181; Dalz. & Gibs. Suppl. p. 76. *Jatropha moluccana*, Linn. Sp. Pl. (1753) p. 1006.—Flowers: Apr.-May. VERN. *Akrot.*

Codiæum variegatum, Blume, Bijdr. (1825) p. 606. An evergreen shrub with alternate leaves often waved and infinitely variable in size, form, and coloring, a native of the Molucca Islands. The varieties of this plant, which is the *Croton* of Anglo-Indians, are numerous. Somewhat less than 20 years ago a perfect rage for its cultivation prevailed in the Bombay Presidency and it was grown everywhere in gardens. Woodrow (Gard. in Ind. ed. 5, pp. 435–442) enumerates more than 30 varieties. Fl. B. I. v. 5, p. 399; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 371, & Gard. in Ind. ed. 5, p. 435; Prain, Beng. Pl.

p. 944. *Codiæum pictum*, Hook. f. Bot. Mag. t. 3051. *Croton variegatum*, Linn. Sp. Pl. ed. 3 (1764) p. 1424; Grah. Cat. p. 182; Dalz. & Gibs. Suppl. p. 77.

Manihot utilissima, Pohl, Pl. Bras. Icon. (1827) v. 1, p. 32, t. 24. A tall herbaceous plant with a tuberous root and palmate leaves, a native of S. America, yielding *Cassava* and *Tapioca*, has been occasionally cultivated in gardens. Graham (Cat. p. 183) says that it was introduced by the Portuguese at Goa, but is grown in Bombay gardens simply as an ornamental plant and not used economically. Fl. B. I. v. 5, p. 239; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372; Prain, Beng. Pl. p. 940; Watt, Dict. Econ. Prod. v. 5, p. 157. *Jatropha manihot*, Linn. Sp. Pl. (1753) p. 1007; Grah. Cat. p. 183; Dalz. & Gibs. Suppl. p. 77.

Hippomane mancinella, Linn. Sp. Pl. (1753) p. 1191. A middle-sized tree 40–50 ft. high, with virulent poisonous juice. Leaves ovate or elliptic, serrulate or crenate, shining, with a single gland on the upper side at the junction with the petiole. Fruit a roundish, fleshy, yellowish-green drupe. The tree, which is a highly poisonous one, is a native of Tropical S. America and has been grown in the Victoria Gardens, Bombay. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 373.—Flowers: May.

Ricinus communis, Linn. Sp. Pl. (1753) p. 1007. The well-known *Castor-oil Plant* cultivated throughout India and naturalized near habitations, but, probably, a native of Africa. Two varieties are commonly grown, the larger with green, the smaller with red stem and flowers. The bright-colored leaved varieties are very effective in gardens. The oil is largely used for burning and when cold-drawn furnishes the medicinal castor-oil. Very full particulars as to mode of cultivation of the plant and extraction and uses of the oil will be found in Watt's Dictionary of Economic Products. Fl. B. I. v. 5, p. 457; Grah. Cat. p. 183; Dalz. & Gibs. Suppl. p. 78; Trim. Fl. Ceyl. v. 4, p. 72; Talb. Trees, Bomb. ed. 2, p. 318; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 372, & Gard. in Ind. ed. 5, p. 435; Prain, Beng. Pl. p. 952; Watt, Dict. Econ. Prod. v. 6, part 1, p. 506.—VERN. *Erand.*

Hura crepitans, Linn. Sp. Pl. (1753) p. 1008. A branching shady tree known as the *Sand-box Tree*, a native of Tropical America, with glossy leaves and reddish inconspicuous flowers, has been planted at Poona and Khandala. The curious round hard-shelled fruit is about the size of an orange and when ripe often bursts with great force and with a noise like the report of a pistol. The plant abounds in a poisonous milky juice which is said to cause blindness if applied to the eyes. Dalz. & Gibs. Suppl. p. 76; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 373.

ORDER CXVI. URTICACEÆ.

Herbs, shrubs, or trees. Leaves usually alternate, often oblique; stipules various. Flowers cymose or clustered, usually minute, monœcious or diœcious, 1-sexual, hermaphrodite, or rarely polygamous, often crowded on the surface of a fleshy flat concave or globose receptacle, sometimes hollow and closed (*Ficus*); bracts usually small or 0,

sometimes 2–4 or more, involucrate; bracteoles usually small or 0, sometimes conspicuous. Perianth simple, calycine, regular or irregular, equally or unequally toothed, lobed or partite; segments imbricate or valvate. Disk hypogynous, obscure or 0. Stamens as many as and opposite to the perianth-lobes, sometimes aduate to their base (rarely fewer or more); filaments free or rarely connate at the base; anthers 2-celled. Pistillode in male flowers small or 0. Ovary superior, 1-celled; ovule solitary; style often excentric, simple or 2-fid with stigmatic arms, or stigma sessile, plumose or penicillate. Fruit simple, indehiscent, a drupe or samara, or of free achenes, or compound in a confluent mass of perianths and pericarps. Seed erect, lateral or pendulous; testa membranous; albumen copious, scanty or 0; embryo straight or curved.—DISTRIB. Throughout both hemispheres; genera 109; species 1500.

Plants with watery juice.
- Anthers in bud erect; style 2-fid; ovule pendulous.
  - Fruit dry, winged, leaves deciduous ..... 1. HOLOPTELEA.
  - Fruit a drupe; leaves persistent.
    - Stipules free.
      - Male sepals imbricate; cotyledons broad ..... 2. CELTIS.
      - Male sepals induplicate-valvate; cotyledons narrow ..... 3. TREMA.
    - Stipules connate, sheathing the bud ..... 4. GIRONNIERA.
- Anthers in bud reversed; stamens inflexed; style undivided or 0; ovule erect, orthotropous.
  - Leaves and stems with stinging hairs.
    - Ovary oblique; an annual herb ..... 5. FLEURYA.
    - Ovary straight; a perennial herb ..... 6. GIRARDINIA.
  - Leaves and stems without stinging hairs.
    - Female perianth 3–5-partite or obsolete.
      - Leaves opposite ..... 7. LECANTHUS.
      - Leaves alternate ..... 8. ELATOSTEMA.
    - Female perianth tubular, shortly toothed or subentire, enclosing the achenes.
      - Flowers not involucrate.
        - Fruiting perianth dry, membranous; stigma filiform.
          - Shrubs; stigma persistent ..... 9. BŒHMERIA.
          - Herbs (rarely suffruticose); stigma jointed, deciduous ..... 10. POUZOLZIA.
        - Fruiting perianth fleshy; stigma penicillate ..... 11. DEBREGEASIA.
      - Flowers involucrate.
        - Female perianth tubular, 4-fid; stamens 3–4; stigma penicillate ..... 12. PARIETARIA.
        - Female perianth 0; stamen 1; stigma filiform ..... 13. FORSKOHLEA.

Plants with milky juice.
- Anthers in bud reversed; stamens inflexed; ovule pendulous, anatropous; shrubs or trees.
  - Male flowers subcapitate; female perianths not confluent; style 2-fid ..... 14. STREBLUS.
  - Male flowers in globose heads; female perianths confluent; style undivided, elongate ..... 15. PLECOSPERMUM.
- Anthers in bud erect; trees or shrubs.
  - Flowers on the inner wall of a closed receptacle ..... 16. FICUS.
  - Flowers all exposed.
    - Male flowers on a disciform receptacle; females solitary, without perianth; stamens 3–8 ..... 17. ANTIARIS.
    - Flowers in naked or lanceolate heads; female perianth tubular; stamen 1 ..... 18. ARTOCARPUS.

1. **HOLOPTELEA,** Planch.

Deciduous trees. Leaves alternate, distichous, penninerved, entire; stipules lateral, scarious. Flowers polygamous or hermaphrodite, the males without a rudimentary ovary, in fascicles at scars of previous year's shoots which are scaly but leafless. Perianth simple, calycine, 4–8-partite; lobes imbricate, often unequal. Stamens 4–8 (usually 7 or 8); filaments erect, ultimately exserted; anthers hairy. Ovary stipitate, compressed; ovule solitary, pendulous; style short, 2-fid, the arms stigmatic within throughout their whole length. Fruit dry, indehiscent, samaroid and flat, the nucleus expanded as an obliquely ovate reticulate wing. Seed flat; albumen 0; cotyledons longitudinally complicate; radicle small, superior.—DISTRIB. Throughout the greater part of India except in the higher hills; Ceylon, Cochinchina.

1. **Holoptelea integrifolia,** *Planch. in Ann. Sc. Nat.* sér. 3, v. 10 (1848) p. 266. A large spreading glabrous deciduous tree 50–60 ft. high; bark grey, pustular. Leaves 3–5 by $1\frac{1}{4}$–$2\frac{1}{2}$ in., elliptic, acuminate, glabrous, entire (those of the seedlings and shoots often serrate), base rounded or cordate; main nerves 5–7 pairs; petioles $\frac{1}{4}$–$\frac{1}{2}$ in. long. Flowers usually male and hermaphrodite mixed, in short racemes or fascicles at the scars of fallen leaves. Sepals often 4, pubescent, $\frac{1}{16}$–$\frac{1}{10}$ in. long. Stamens 4–8 (often 6 or 7); filaments glabrous; anthers pubescent. Ovary compressed, pubescent, 1-celled, stalked, the stalk lengthening as the seed ripens; styles $\frac{1}{10}$–$\frac{1}{6}$ in. long, stigmatose on the inside throughout their whole length. Samara nearly orbicular, 1 in. in diam., with reticulately veined wings. Fl. B. I. v. 5, p. 481; Dalz. & Gibs. p. 238; Wight, Icon. t. 1968; Trim. Fl. Ceyl. v. 4, p. 80; Talb. Trees, Bomb. ed. 2, p. 321; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 958; Watt, Dict. Econ. Prod. v. 4, p. 261. *Ulmus integrifolia,* Roxb. Cor. Pl. v. 1 (1795) p. 56, t. 78, & in Willd. Sp. Pl. v. 1 (1797) p. 1326; Grah. Cat. p. 188; Bedd. Flor. Sylvat. t. 310.—Flowers: Feb.–Mar. VERN. *Vávli.*

Throughout the Presidency in deciduous forests, *Talbot.* KONKAN: *Dalzell*!; Nagotna, common, *Graham*; Bombay, *Law*! DECCAN: Poona, *Cooke*!, *Woodrow*!; Khandala, *Graham.* S. M. COUNTRY: *Graham*; Belgaum, *Ritchie,* 1002!—DISTRIB. India (Subhimalayas, Ajmere, Bandelkand, Behar, Birma, W. Peninsula); Ceylon, Cochinchina.

2. **CELTIS,** Linn.

Trees or shrubs, evergreen or deciduous. Leaves alternate, ovate, entire or serrate, bifarious, base 3-nerved; stipules lateral, free. Flowers small, polygamous, solitary or cymose, the males and androgynous cymes usually at the base of the shoots, the females in the upper axils. Perianth simple. Sepals 4 or 5, imbricate. Petals 0. Stamens 4 or 5, short, erect in bud, inserted round a woolly torus. Ovary sessile; ovule pendulous; style-arms simple or lobed. Fruit a small ovoid or globose drupe; endocarp hard, smooth or rugose. Seed with membranous testa; albumen scanty or 0; embryo curved; cotyledons broad, inflexed, flat or replicate, surrounding the up-curved radicle.—DISTRIB. Species about 60, temperate and tropical, especially in the N. hemisphere.

Leaves unequal-sided at the base; sepals not ciliate ..... 1. *C. cinnamomea.*
Leaves equal-sided at the base; sepals ciliate ..... 2. *C. Wightii.*

1. **Celtis cinnamomea,** *Lindl. in Wall. Cat.* (1828) 3696. A tree 30–40 ft. high; branchlets tomentose. Leaves when young membranous, when adult chartaceous, $2\frac{1}{4}$–4 by 1–$1\frac{7}{8}$ in., obliquely ovate, long-acuminate, entire, crenate or serrate, glabrous, dark-green, 3-nerved to below the tip, reticulately veined, base acute or rounded; petioles $\frac{3}{8}$ in. long; stipules $\frac{1}{6}$ in. long, lanceolate-subulate, caducous. Flowers in paniculate cymes, the flowers of the upper panicles often all fertile, the lower panicles with the upper flowers fertile, the lower male; pedicels filiform, of variable lengths. Sepals 4–5 (usually 5), $\frac{1}{10}$ in. long, elliptic-oblong, obtuse, finely mottled, entire. Stamens 4–5 (commonly 4), surrounding a woolly disk. Ovary seated on a woolly disk, sessile, ovoid; styles $\frac{1}{5}$ in. long, spreading, curled, villous. Drupe pisiform, narrowed to the obtusely beaked tip. Fl. B. I. v. 5, p. 482; Kurz, For. Fl. v. 2, p. 472; Trim. Fl. Ceyl. v. 4, p. 81; Prain, Beng. Pl. p. 959; Watt, Dict. Econ. Prod. v. 2, p. 243. *Celtis dysodoxylon,* Thw. Enum. p. 267; Bedd. For. Man. in Flor. Sylvat. p. ccxix. *C. Roxburghii,* Dalz. & Gibs. Bo. Fl. p. 237 (*not* of Planch.). *Celtis tetrandra,* Talb. Trees, Bomb. ed. 2, p. 322 (*not* of Roxb.).—Flowers: Feb.–Apr. VERN. *Brumaj.*

KONKAN: *Law*!; S. Konkan, *Ritchie,* 692! DECCAN: Khandala, *Cooke*!, *Bhiva*! KANARA: on the Kála naddi, *Ritchie,* 692!—DISTRIB. India (Sikkim Himalaya, Assam, Chittagong, Birma, Behar, N. Bengal, W. Peninsula); Ceylon, Malay Islands.

From the description given of the inflorescence, it seems clear that the plant described by Dalzell & Gibson (Bo. Fl. l. c.) under the name *Celtis Roxburghii* was this plant and not *Celtis tetrandra,* Roxb. As far as I know, *Celtis tetrandra,* Roxb., does not occur in the Bombay Presidency. Talbot gives it in his list (p. 322), but as he very kindly sent me from India the specimens he had so named, I have been enabled to diagnose them as unmistakably *Celtis cinnamomea.*

2. **Celtis Wightii,** *Planch. in Ann. Sc. Nat.* sér. 3, v. 10 (1848) p. 307. A middle-sized tree 30–40 ft. high; young shoots puberulous; young foliage pink. Leaves rigidly coriaceous, 3–6 by $1\frac{3}{4}$-$2\frac{1}{2}$ in., ovate or elliptic-oblong, acuminate, entire or sparsely crenate-serrate, conspicuously 3-nerved almost to the tip, reticulately veined with transverse veins, base equal-sided, rounded or acute; petioles $\frac{1}{4}$–$\frac{3}{8}$ in. long; stipules somewhat peltate, caducous. Flowers yellow, in axillary short puberulous cymes, the male and fertile together, the former below the latter. Sepals acuminate, ciliate. Stamens 5. Drupes shortly pedicellate, ovoid, $\frac{1}{4}$–$\frac{1}{2}$ in. long, scarlet, the tip obtuse or 2-cuspidate. Fl. B. I. v. 5, p. 483; Wight, Icon. t. 1969; Bedd. For. Man. in Flor. Sylvat. p. ccxviii; Trim. Fl. Ceyl. v. 4, p. 81; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Watt, Dict. Econ. Prod. v. 2, p. 244. *Bosea trinervia,* Roxb. Fl. Ind. v. 2, p. 87.

Rare in the Bombay Presidency. DECCAN: Khandala, *Woodrow*!, *Bhiva*!—DISTRIB. India (W. Peninsula, Andaman Islands); Ceylon, Malay Islands, Australia.

3. **TREMA,** Lour.

Shrubs or trees. Leaves alternate, serrate, 3–7-nerved at the base; stipules lateral, caducous. Flowers monœcious, subdiœcious, or polygamous, in small axillary cymes. Perianth simple. MALE FLOWERS: Sepals 4–5, induplicate-valvate or subimbricate. Petals 0. Stamens 4–5, erect in bud. Pistillode small or 0. FEMALE FLOWERS: Sepals as in the male when stamens are present, flat and subimbricate if stamens 0. Petals 0. Ovary sessile; ovule pendulous; style central with 2 linear

arms. Fruit a small straight ovoid or subglobose drupe usually tipped by the style; endocarp hard. Seed small; testa membranous; albumen fleshy; cotyledons narrow; radicle ascending.—DISTRIB. Species about 20, tropical and subtropical.

1. **Trema orientalis,** *Blume, Mus. Bot.* v. 2 (1856) p. 62. A fast-growing short-lived tree 25–30 ft. high with straight spreading branches; branchlets pubescent. Leaves 2¾–5 by 1¼–1¾ in., obliquely ovate, acuminate, crenate-serrulate, chartaceous, somewhat rough above, clothed beneath with soft often white pubescence, base unequal-sided, rounded or subcordate; lateral basal nerves reaching to half the length of the leaf; petioles ¼–⅜ in. long. Flowers in axillary pubescent cymes longer than the petiole, the male cymes rather more compact than the female and usually on different trees. MALE FLOWERS: Sepals $\frac{1}{10}$ in. long, elliptic-lanceolate. Stamens 5. Pistillode small. FEMALE FLOWERS: Sepals $\frac{1}{16}$ in. long, elliptic, ciliolate. Ovary sessile; style-arms $\frac{1}{16}$ in. long, villous, slightly incurved. Drupe ⅛ in. in diam., black when ripe. Fl. B. I. v. 5, p. 484; Trim. Fl. Ceyl. v. 4, p. 82; Talb. Trees, Bomb. ed. 2, p. 322; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 959; Watt, Dict. Econ. Prod. v. 6, part 4, p. 75. *Sponia Wightii,* Planch. in Ann. Sc. Nat. sér. 3, v. 10 (1848) p. 322; Wight, Icon. t. 1971; Dalz. & Gibs. p. 238; Bedd. Flor. Sylvat. t. 311. *Celtis orientalis,* Linn. Sp. Pl. (1753) p. 1044; Grah. Cat. p. 189.—Flowers more or less throughout the year. VERN. *Gol.*

KONKAN: *Law!, Lambert!, Dalzell!, Talbot!*; Kanheri forests, *Graham*; Salsette, *Graham*; Matheran, *Cooke!, H. M. Birdwood.* DECCAN: Khandala, *Woodrow!*; Lanoli, *Cooke!* S. M. COUNTRY: Rámghát, *Ritchie,* 935! KANARA: in moist forests common, *Talbot.*—DISTRIB. More or less throughout India; Ceylon, Malay Islands.

The tree is known as the *Nettle* or *Charcoal-Tree.* It is employed for making charcoal for the manufacture of gunpowder.

4. GIRONNIERA, Gaud.

Unarmed evergreen trees or shrubs. Leaves alternate, penninerved; stipules sheathing the buds, caducous. Flowers dicœcious, in axillary cymes or the females solitary. MALE FLOWERS minute, globose. Sepals 5, broad, obtuse, imbricate. Stamens 5; filaments erect in bud. Pistillode woolly. FEMALE FLOWERS: Sepals narrower than in the male, acute. Ovary sessile; ovule pendulous; style central with 2 spreading filiform arms. Drupe ovoid or subglobose; endocarp hard. Albumen copious, scanty or 0. Embryo contorted.—DISTRIB. Species 8 or 10, South Indian, Malayan, and Chinese.

1. **Gironniera reticulata,** *Thw. Enum.* (1861) p. 268. A very large tree with buttresses at the base; bark grey, smooth; young parts glabrous or sparsely appressedly hairy. Leaves 3–5 by 1½–2¼ in., ovate to ovate-oblong, acuminate or caudate, glabrous, smooth, shining, base rounded or acute; main nerves 8–12 pairs, conspicuous beneath with reticulate venation between; petioles ¼–½ in. long; stipules connate, lanceolate, hairy, caducous. Flowers axillary, the males in short paniculately branched cymes, the females solitary. MALE FLOWERS: Perianth-segments 5, rounded, obtuse. Stamens 5. Pistillode a small

tuft of hairs. FEMALE FLOWERS: Sepals narrower than in the male, acute. Ovary glabrous. Drupe ovoid, hardly compressed, stoutly beaked, glabrous, $\frac{5}{8}$–$\frac{3}{4}$ in. long (including the beak). Fl. B. I. v. 5, p. 486; Bedd. Flor. Sylvat. t. 313, fig. 1; Trim. Fl. Ceyl. v. 4, p. 83; Talb. Trees, Bomb. ed. 2, p. 323; Watt, Dict. Econ. Prod. v. 3, p. 502. —Flowers: Nov.–Jan.

KANARA: Sirsi and Siddapur subdivisions of N. Kanara, *Talbot*; Sonda (N. Kanara), *Talbot*, 3646!—DISTRIB. India (Sikkim Himalaya, Assam, Birma, Pegu, W. Peninsula); Ceylon, Java.

5. **FLEURYA,** Gaud.

Annual herbs with stinging hairs. Leaves alternate, toothed, 3-nerved; stipules connate in opposite pairs or 0. Flowers monœcious in the only Bombay species, clustered, the clusters cymose in solitary axillary spikes or racemes, 1-sexual or androgynous. MALE FLOWERS: Sepals 4–5, ovate-lanceolate, subvalvate or imbricate. Petals 0. Stamens 4 or 5, inflexed in bud. Pistillode globose or clavate. FEMALE FLOWERS: Sepals 4, free, imbricate or connate in a cup-shaped calyx, with the upper hooded and the anterior minute or obsolete. Ovary oblique; ovule solitary, erect; style obliquely ovoid or linear, at length hooked, sometimes with 2 basal arms. Fruit an oblique compressed membranous exserted achene. Seed with very scanty albumen; cotyledons broad.—DISTRIB. Tropical and S. African; species 8.

1. **Fleurya interrupta,** *Gaud. in Freyc. Voy. Bot.* (1826) p. 497. Stems 2–4 ft. high, erect, flexuous, branched, furrowed, the whole plant more or less sparsely clothed with scattered stinging hairs. Leaves 1–6 by $\frac{1}{2}$–4 in., broadly ovate, acuminate, coarsely crenate-serrate, with a few scattered stinging hairs, base truncate, cordate or shortly cuneate; petioles as long as or longer than the leaf-blade, very slender; stipules long, 2-fid to about the middle, the segments linear-subulate, ciliolate. Flowers greenish, on solitary interrupted axillary racemes of variable length (2–10 in.), arranged in distant paniculate cymes along the rhachis. MALE FLOWERS few, soon fading. Perianth $\frac{1}{20}$ in. long; sepals concave. Stamens 4. FEMALE FLOWERS: Perianth $\frac{1}{16}$ in. long, cup-shaped, 4-toothed, on a decurved pedicel. Achenes $\frac{1}{16}$ in. long and nearly as broad as long, much compressed, with 3 keels round the margin and with a subcordate or truncate base; style subulate, curved towards the base of the achene. Fl. B. I. v. 5, p. 548; Dalz. & Gibs. p. 238; Wight, Icon. t. 1975; Trim. Fl. Ceyl. v. 4, p. 104; Weddell, Monog. (1856) p. 115, t. A, fig. 9; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 961. *Urtica interrupta,* Linn. Sp. Pl. (1753) p. 985; Grah. Cat. p. 187.—Flowers: Aug.

KONKAN: *Law*!, *Stocks*!; Parel (Bombay), *Ranade*!, *Woodrow*!; Matheran, *H. M. Birdwood.* S. M. COUNTRY: Londa, *Cooke*!; Belgaum, *Ritchie,* 1365! KANARA: *Law*!—DISTRIB. India (Behar, C. Bengal, Khasia Hills, W. Peninsula); Ceylon, Malay and Pacific Islands, China, Abyssinia.

6. **GIRARDINIA,** Gaud.

Herbs or undershrubs with stout stinging hairs. Leaves alternate, 3-nerved, entire or lobed, serrate; stipules connate, foliaceous. Flowers monœcious (in the Bombay species), in simple or panicled cymes or

heads armed with stinging hairs. Perianth simple. MALE FLOWERS: Sepals 4–5, valvate. Petals 0. Stamens 4–5, inflexed in bud; filaments free. Pistillode globose or cup-shaped. FEMALE FLOWERS: Perianth tubular, ventricose, 2–3-toothed, at length split on one side, spathaceous. Ovary straight; ovule solitary, erect; stigma subulate, papillose. Fruit a broad compressed achene with thickish pericarp; albumen scanty or 0; cotyledons broad.—DISTRIB. Tropical Asia and Africa; species 7.

1. **Girardinia zeylanica,** *Decaisne, in Jacq. Voy.* (1844) p. 152. A tall robust, perennial-rooted herb, 4–6 ft. high, closely armed with slender stinging hairs; stem and branches furrowed. Leaves 4–10 in. long and often as broad, the upper variously lobed and more or less deeply cut though never to the base, more or less pubescent, coarsely serrate, the serratures triangular, sometimes $\frac{1}{2}$ in. deep, base cordate or truncate; petioles 3–7 in. long, armed with stinging hairs; stipules $\frac{1}{2}$–$\frac{5}{8}$ by $\frac{1}{3}$ in., ovate, cordate, shortly acuminate, 2-fid. Flowers in pedunculate racemose cymes, the males in the lower, the females in the upper axils. MALE FLOWERS; Sepals $\frac{1}{16}$ in. long, elliptic, obtuse. Pistillode subglobose, slightly hollowed at the apex. FEMALE FLOWERS: Perianth $\frac{1}{10}$ in. long, 3-lobed at first to less than $\frac{1}{2}$ way down, afterwards splitting on one side; lobes triangular, acute, hairy. Fruiting cymes short, stout, 1–2 in. long by 1–1¼ in. broad, densely clothed with slender stinging hairs; peduncles rather shorter than the cyme. Achenes $\frac{1}{6}$ in. long and nearly as broad as long, obliquely ovate, much compressed. Weddell, Monog. Urtic. p. 166; Prain, Beng. Pl. p. 961. *Girardinia heterophylla*, Dalz. & Gibs. p. 238 (*not* of Decaisne); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516. *G. heterophylla* var. *zeylanica*, Hook. f. Fl. B. I. v. 5, p. 551; Watt, Dict. Econ. Prod. v. 3, p. 501. *Urtica zeylanica*, Burm. Thes. Zeyl. p. 231. *Urtica heterophylla*, Roxb. Fl. Ind. v. 3 (1832) p. 586 (*not* of Vahl); Wight, Icon. t. 687; Grah. Cat. p. 187.—Flowers: Oct. VERN. *Motha Khájoti.*

KONKAN: *Stocks*!; W. Ghâts, *Woodrow.* DECCAN: Mahableshwar, *Cooke*!, *H. M. Birdwood, Woodrow.*—DISTRIB. India (Chota Nagpur, W. Peninsula); Ceylon.

The plant furnishes a very strong fibre, but owing to its stinging properties the extraction is difficult.

7. LECANTHUS, Wedd.

Succulent herbs; stems ascending, decumbent and often rooting at the base. Leaves opposite in unequal pairs, ovate, serrate, 3-nerved from the oblique base; stipules scarious. Flowers monœcious or diœcious, crowded on solitary, axillary, pedunculate, bracteate, saucer-like, fleshy receptacles. MALE FLOWERS: Sepals 4–5, subequal. Stamens 4–5; filaments inflexed in bud. FEMALE FLOWERS: Sepals 3 or 4, minute, nearly equal or very unequal. Ovary straight; ovule erect; stigma sessile, penicillate. Achene ovoid, compressed; albumen fleshy; cotyledons ovate.—DISTRIB. India, Ceylon, China, Java, Africa; species 2.

A low weak herb rarely reaching 6 in. high; female perianth of 3 very unequal segments ..... 1. *L. Wightii.*

More robust, reaching 24 in. high; female perianth of 4 subequal segments ..... 2. *L. Wallichii.*

1. **Lecanthus Wightii,** *Wedd. in Ann. Sc. Nat.* sér. 4, v. 1 (1854) p. 187. A low weak herb; stem sometimes scarcely 1 in., rarely exceeding 4–6 in. high. Leaves opposite, ½–1½ by ¼–1 in., the upper the largest, ovate, acute, sharply serrate, sparingly hairy above, glabrous beneath, 3-nerved from an oblique acute base; petioles ⅛–¼ in. long, very slender. Flowers on fleshy receptacles ¼–⅓ in. in diam., supported on stalks rarely more than 1 in. long. Perianth of female flowers 3-partite, the segments very unequal, one larger hooded at the tip, the other 2 flat. Achenes narrowly oblong, longer than the perianth, red. Wedd. Monog. Urtic. (1856) p. 280, t. 9, fig. C; C. H. Wright, in Journ. Linn. Soc. v. 26 (1899) p. 480; Collett, Flor. Simlen. (1902) p. 465; Hook. f. Fl. B. I. v. 5, p. 559 *ex parte*; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516. *Elatostema ovata*, Wight, Icon. t. 1985? *Procris obtusa*, Royle, Illustr. t. 83, fig. 3.—Flowers: Sept.–Oct.

Dalzell without locality in Herb. Kew.! KONKAN: Matheran, *Woodrow, H. M. Birdwood.* S. M. COUNTRY: Belgaum, *Ritchie*, 1372!—DISTRIB. Throughout India, ascending to 10,000 feet; Africa, China.

2. **Lecanthus Wallichii,** *Wedd. in Ann. Sc. Nat.* sér. 4, v. 1 (1854) p. 187. Stems 12–24 in. high, robust. Leaves 2–4½ by 1–2 in., ovate-lanceolate, acute or acuminate, serrate, sparsely hairy above, glabrous beneath, base acute; petioles ¼–1½ in. long. Receptacles ½–1½ in. in diam., on stalks varying from 2–12 in. long. Perianth of female flowers 4-partite; segments subequal, hooded at tip. Staminodes 4, opposite to and ½ as long as the perianth-segments, linear, flat, incurved at the apex. Achenes ⅕ in. long, ovoid, shorter than the perianth, muriculate, purple-brown. C. H. Wright, in Journ. Linn. Soc. v. 26 (1899) p. 480; Collett, Flor. Simlen. (1902) p. 465. *Lecanthus Wightii*, Hook. f. Fl. B. I. v. 5, p. 559 *ex parte*; Trim. Fl. Ceyl. v. 4, p. 108. *Elatostema oppositifolium*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 179; Dalz. & Gibs. p. 239. *Procris pedunculatis*, Wall. Cat. 4634; Royle, Illustr. t. 83, fig. 2.—Flowers: Oct.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks!*, *Law*! DECCAN: Khandala, *Cooke*!—DISTRIB. Throughout India, ascending to 10,000 feet; Ceylon, China.

8. ELATOSTEMA, Forst.

Herbs or undershrubs. Leaves alternate or sometimes with a minute leaf subopposed to the normal leaf, distichous, sessile or subsessile, usually very oblique and inequilateral, 3-nerved from the base or shortly above it; stipules lateral or intrapetiolar. Flowers very minute, monœcious or diœcious, crowded on sessile or pedunculate 1-sexual usually involucrate receptacles; bracts of the involucre rounded, oblong or ovate, the outer at times with a dorsal spur or horn, bases nearly free or more or less confluent in a fleshy circular or lobed disk, the tips projecting from its margin, rarely the margin entire; bracteoles densely crowded, those of the male heads usually oblong, of the female heads spathulate; florets often in clusters in the heads, each cluster surrounded by a partial bract and the head then lobulate. MALE FLOWERS: Sepals 4–5, of which 2 or more are usually tuberculate or spurred on the back. Stamens 4–5, inflexed in bud. Pistillode minute. FEMALE

FLOWERS: Sepals 3–5, very minute, much shorter than the ovary, persistent. Staminodes minute or 0. Ovary straight; ovule erect; stigma penicillate. Fruit a minute ellipsoid or fusiform usually ribbed achene, subtended by the very minute perianth. Seed usually exalbuminous; testa membranous; cotyledons ovate or semi-cylindric.—DISTRIB. Tropics of the Old World except Australia; species about 50.

A herb or undershrub, 3–4 ft. high..... 1. *E. lineolatum.*
A small herb, 4–8 in. high ..... 2. *E. cuneatum.*

1. **Elatostema lineolatum,** *Wight, Icon.* v. 6 (1853) p. 11, t. 1984. Herbaceous or suffruticose, 3–4 ft. high, pubescent or tomentose. Leaves 2–5½ by ¾–1¾ in., very variable, subsessile or shortly petiolate, oblong or oblong-lanceolate or cuneately obovate or linear-oblong, often obliquely falcate, acuminate or caudate, entire or coarsely crenate, toothed or serrate above the middle, base acute or cuneate; lateral nerves few; cystoliths crowded and conspicuous; stipules linear-lanceolate. Flowers dicœcious; receptacle of both sexes sessile, capitate. MALE FLOWERS pisiform; bracts rounded, pubescent; bracteoles oblong with pubescent costa and tips. Sepals rounded, obtuse, pubescent. FEMALE FLOWERS smaller than the male; bracteoles spathulate, ciliate. Sepals minute, denticulate. Achenes ellipsoid, acute.

This is the var. *major* of Thwaites (Enum. p. 260). I cannot find any good characters to separate VAR. *integrifolia,* Hook. f. (Fl. B. I. v. 5, p. 565), from this. Fl. B. I. v. 5, p. 565; Weddell, Monog. Urtic. p. 312; Trim. Fl. Ceyl. v. 4, p. 110; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516.

KONKAN: *Stocks*!, *Law*! S. M. COUNTRY: Castlerock, *Bhiva*! KANARA: *Stocks*!, *Law*!; Kála naddi, *Ritchie*, 1371!; Honavar, *Dalzell*!—DISTRIB. India (Tropical Himalaya, W. Peninsula); Ceylon.

2. **Elatostema cuneatum,** *Wight, Icon.* v. 6 (1853) p. 35, t. 2091, fig. 3. An annual herb, more or less pubescent, 4–8 in. high; stem simple or scarcely branched, often rooting near the base. Leaves (the uppermost) ¾–1½ by ⅜–⅝ in., subsessile, falcately cuneate or hatchet-shaped, coarsely crenate above the middle, tip rounded or subacute, sometimes with a minute opposite leaflet at the base, the upper surface with numerous cystoliths; stipules ovate; lower leaves on the stem few, very small, sometimes nearly entire. FEMALE FLOWERS: Heads sessile, solitary, at each node, ⅛–¼ in. in diam.; bracts of the involucre pubescent; bracteoles oblong-spathulate, shortly ciliate. Perianth-segments of female 3, very short. Achenes $\frac{1}{16}$ in. long., ellipsoid, ribbed, yellow. MALE FLOWERS not seen. Fl. B. I. v. 5, p. 568; Dalz. & Gibs. p. 239; Wedd. Monog. Urtic. p. 330; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516.—Flowers: Sept.–Oct.

KONKAN: W. Ghâts, *Woodrow*; on old walls Mahim woods, Bombay, *Dalzell & Gibson*; Bombay, *Dalzell*!; walls at Thana, *Gibson*! S. M. COUNTRY: Belgaum, *Dalzell & Gibson.*—DISTRIB. India (Sikkim Himalaya, W. Peninsula).

9. BŒHMERIA, Jacq.

Shrubs or small trees. Leaves alternate or opposite, toothed, 3-nerved at the base; stipules usually free, deciduous. Flowers monœcious or dicœcious, both sexes in axillary spicate racemose or paniculate

clusters; bracts small, scarious. MALE FLOWERS: Perianth 3-5-lobed or -partite, valvate. Stamens 3–5, inflexed in bud. Pistillode clavate or globose. FEMALE FLOWERS: Perianth tubular, 2–4-toothed, sometimes angled or winged or ventricose in fruit. Ovary included; ovule erect; stigma filiform, persistent. Fruit a crustaceous achene, at first closely covered by the perianth, ultimately free. Seed with a thinly membranous testa; albumen copious or scanty; cotyledons ovate.—DISTRIB. Chiefly tropical; species about 45.

Flower-clusters axillary; leaves all alternate	1. *B. malabarica.*
Flower-clusters in simple or paniculate spikes; leaves mostly opposite	2. *B. scabrella.*

1. **Bœhmeria malabarica,** *Wedd. Monog. Urtic.* (1856) p. 355. An erect shrub or small tree; bark thin, greyish-brown; stems and branches terete, pubescent. Leaves membranous, alternate, subequal or alternately large and small, the larger 4–8 by 1¾–3½ in., elliptic-lanceolate, acuminate or caudate, crenulate or serrulate from above the rounded subacute or sometimes cordate base, glabrous and sometimes rugose above, pubescent beneath, strongly 3-nerved from the base with 2–4 lateral pairs of nerves above, reticulately veined between the nerves; petioles ¾–3 in. long; stipules small, deciduous. Flowers monœcious, minute, greenish-white, in small axillary sessile clusters ⅛–¼ in. in diam., the males and females in different axils. MALE FLOWERS: Perianth 4-partite, pubescent. Stamens 4. Pistillode small, subglobose. FEMALE FLOWERS: Perianth tubular, 4-toothed, pubescent. Achenes minute, ovoid, closely invested by the perianth. Fl. B. I. v. 5, p. 575; Trim. Fl. Ceyl. v. 4, p. 113; Talb. Trees, Bomb. ed. 2, p. 334; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 964; Watt, Dict. Econ. Prod. v. 1, p. 467. *Bœhmeria travancorica*, Bedd. For. Man. in Flor. Sylvat. p. ccxxv, & Anal. Gen. t. 27, fig. 2 (by error *B. ramiflora*).—Flowers: Nov.–Feb.

KONKAN: *Stocks* !, *Law* !, *Talbot*. KANARA: Karwar, *Woodrow*; N. Kanara, in evergreen forests, common on the Siddapur Ghát, *Talbot*; Nilkund Ghát, *Talbot*, 1629!—DISTRIB. India (Sikkim Himalaya, Khasia Mountains, Chittagong, W. Peninsula); Ceylon, Java.

The plant yields a very strong fibre.

2. **Bœhmeria scabrella,** *Gaud. in Freyc. Voy.* (1826) p. 500. A shrub with soft glabrous or strigose more or less grooved branches. Leaves usually opposite, 3½–7 by 1½–4 in., broadly ovate, acuminate or caudate, sharply serrate with triangular serratures, nearly glabrous or pubescent, wrinkled on both surfaces, base rounded or cordate; main nerves 3 from the base, each penninerved; petioles ¾–4 in. long; stipules lanceolate, acute. Flowers in small pisiform clusters on slender (usually simple) erect spikes 4–8 in. long. MALE FLOWERS: Sepals 4, ovate, acuminate. FEMALE FLOWERS: Perianth $\frac{1}{20}$ in. long, somewhat flask-shaped, shortly contracted round the base of the style into a very small unequally 4-toothed mouth. Style $\frac{1}{16}$ in. long, filiform, pubescent, sometimes curled, persistent. Achenes $\frac{1}{25}$ in. long, shining, compressed, closely invested by the gibbous turgid pubescent perianth. C. B. Clarke, in Journ. Linn. Soc. v. 15, p. 124; Prain, Beng. Pl. p. 964. *Bœhmeria platyphylla*, Talb. Trees, Bomb. ed. 2, p. 334 (*not* of Don); Woodr.

in Journ. Bomb. Nat. v. 12 (1899) p. 516. *B. platyphylla* var. *scabrella*, Wedd. Monog. Urtic. (1856) p. 365; Hook. f. Fl. B. I. v. 5, p. 578; Watt, Dict. Econ. Prod. v. 1, p. 484. *Splitgerbera scabrella*, Dalz. & Gibs. Bo. Fl. (1861) p. 239. *Urtica scabrella*, Roxb. Fl. Ind. v. 3 (1832) p. 581; Wight, Icon. t. 691.—Flowers: Apr.–Oct.

The late Mr. C. B. Clarke (Journ. Linn. Soc. l. c.) was of opinion that both *B. scabrella*, Gaud., and *B. rotundifolia*, Don, were quite distinct species from *B. platyphylla*, Don, and that no intermediate forms existed in India. Prain (*l. c.*) is of the same opinion as regards *B. scabrella*. I cannot find that *B. rotundifolia* occurs in the Bombay Presidency. I have not seen any specimens from there; there are none in Herb. Kew.

KONKAN: hilly jungles, *Dalzell & Gibson*; Mira Hills, near Pen, *Dalzell & Gibson*; common in moist forests near the sea-coast, *Talbot*; Pen, *Woodrow*; Goa jungles, *Woodrow*. DECCAN: Koina Valley below Mahableshwar, *Cooke*! KANARA: N. Kanara near the sea-coast, *Talbot*.—DISTRIB. More or less throughout India; Ceylon.

Bœhmeria nivea, Gaud. in Freyc. Voy. (1826) p. 499. The *Rhea Plant*, grown for its fibre chiefly in Bengal and Assam, has been occasionally grown in gardens in the Bombay Presidency. It is a native of the Malay Islands, China and Japan. Jackson, Index Kewen. v. 1, p. 317; Hook. & Arn. in Bot. Beech. Voy. (1841) p. 214; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 964; Watt, Dict. Econ. Prod. v. 1, p. 468.

A full description of the methods of *Rhea* cultivation and the mode of extraction of the fibre may be found in Watt's Dict. Econ. Prod. l. c.

10. **POUZOLZIA**, Gaud.

Herbs or undershrubs. Leaves alternate or the lower (rarely all) opposite, usually entire, 3-nerved at the base, smaller upwards, the uppermost often reduced to bracts; stipules free, often persistent. Flowers minute, usually monœcious, in 1-sexual or androgynous clusters sessile in the axils of leaves or bracts, the individual florets pedicellate; bracteoles small. MALE FLOWERS: Perianth 4–5-partite or -lobed (rarely 3-partite); lobes valvate with concave or abruptly inflexed tips and transversely plicate backs. Stamens 4 or 5 (rarely 3). Pistillode clavate or oblong. FEMALE FLOWERS: Perianth tubular, often beaked; mouth contracted, 2–4-toothed. Ovary included; ovule erect; stigma filiform, jointed to the top of the ovary, soon deciduous. Fruit a small achene with brittle shining pericarp, enclosed in but usually free from the marcescent perianth. Seed with membranous testa; albumen very scanty or 0; cotyledons ovate.—DISTRIB. Chiefly tropical Asiatic; enumerated species about 50, but reducible to a smaller number.

Lobes of the male perianth convex or gibbous on the back ...	1. *P. indica.*
Lobes of the male perianth abruptly inflexed above the middle, transversely folded at the flexure, hence the buds truncate.	
Stem terminating in a bracteate spike; stamens 5	2. *P. pentandra.*
Stem not running out into a bracteate spike; flowers axillary; stamens 3–5.	
Stamens 5	3. *P. Bennettiana.*
Stamens 3–4	4. *P. integrifolia.*

1. **Pouzolzia indica,** *Gaud. in Freyc. Voy.* (1826) p. 503. A perennial-rooted herb very variable in size and habit, glabrous, hoary, pubescent or hirsute; stem erect or prostrate, 6–20 in. long, stout or slender. Leaves opposite or alternate, ¾–1½ by ⅜–⅝ in., ovate or ovate-lanceolate, obtuse, acute or acuminate, quite entire, hairy, base acute or rounded; nerves 1 pair above the 3 basal ones, sparingly branched; petioles ⅛–¾ in. long; stipules ovate, acuminate, ciliate. Flowers in small axillary androgynous clusters, strigose with simple or hooked hairs. MALE FLOWERS: Sepals 4, dorsally rounded, acute. Stamens 4. Pistillode small, clavate. FEMALE FLOWERS: Perianth tubular, persistent, ribbed, 2-fid at the apex, closely investing the achene. Achenes $\frac{1}{20}$ in. long, broadly ovoid, acute, smooth and shining, white with a dark-colored tip. Fl. B. I. v. 5, p. 581; Dalz. & Gibs. p. 240; Wight, Icon. t. 1980, fig. 1 & t. 2100, fig. 40; Wedd. Monog. Urtic. p. 398; Trim. Fl. Ceyl. v. 4, p. 115; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 965. *Pouzolzia procumbens*, Wight, Icon. t. 2099, n. 35. *Parietaria indica*, Linn. Mant. p. 128; Grah. Cat. p. 187.—Flowers: Sept.

Common in gardens as a weed, *Dalzell & Gibson.* DECCAN: near Dapuri (Poona districts), *Graham*; Khandala, *Bhiva*!; hills near Junnar, *Woodrow.* S. M. COUNTRY: Rámghát, *Ritchie*, 1370!—DISTRIB. Throughout India; Ceylon, Malay Islands, China.

2. **Pouzolzia pentandra,** *Benn. Pl. Jav. Rar.* (1838) p. 64, t. 14. A tall erect glabrous perennial-rooted herb 2–3 ft. high; stem terete below, usually angular above, diffusely branched. Leaves sessile or shortly petiolate, submembranous, the lower opposite, oblong-lanceolate, acute or acuminate, strongly 3-nerved, ciliolate; the upper floral leaves much smaller, sometimes only ¼ in long, mostly alternate, linear-oblong, ovate, often cordate, acuminate or cuspidate, exceeding the flower-clusters. Flowers clustered in the floral leaves (bracts) of an erect or nodding terminal spike reaching 18 in. long. MALE FLOWERS pedicellate, truncate in bud, with a concave top, ciliate. Perianth usually 5-partite. Stamens 5. FEMALE FLOWERS: Perianth in fruit with 2 or 3 broad lateral membranous wings, forming an almost orbicular fruit 2-lobed at the base and the apex. Fl. B. I. v. 5, p. 583; Dalz. & Gibs. p. 240; Wight, Icon. t. 2096, n. 20; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 965; Watt, Dict. Econ. Prod. v. 6, part 1, p. 334.—Flowers: Sept.–Nov.

KONKAN: Island of Karanja, *Dalzell & Gibson.* DECCAN: Kolhapur, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 638!; Cheeta Hill near Belgaum, *Ritchie*, 1369! KANARA: *Law*!; Kála naddi near Supa, *Ritchie*, 1368!—DISTRIB. India (Tropical Himalaya, Assam, Khasia Mountains, Bengal, W. Peninsula); Afghanistan, Java.

VAR. 1. *Stocksii*, Hook. f. Fl. B. I. v. 5, p. 583. Straggling, ramous, seeking support and then ascending (*Wight*); stem and branches glabrous. Leaves glabrous or nearly so, except the hispid margins; lower floral leaves larger. *Pouzolzia Stocksii* (sp.), Wight, Icon. v. 6, p. 41, n. 18; Dalz. & Gibs. p. 240.

KONKAN: *Stocks*! DECCAN: Kheir, *Stocks*! KANARA: *Dalzell*!; near Supa in watercourses, *Ritchie*, $\frac{1368}{2}$!

VAR. 2. *integrifolia*, Hook. f. Fl. B. I. v. 5, p. 583. A large-leaved

flaccid form. Leaves opposite, 2–2½ in. long, sessile, with cordate base, oblong-lanceolate, acute, soft, not ciliate; floral leaves ½ in. long, ovate-lanceolate, acuminate, with cordate base.

KONKAN: *Dalzell!*, *Law!* DECCAN: 23 miles W. of Kolhapur, *Woodrow.* KANARA: *Law!*, *Stocks!*

VAR. 3. *ramosissima*, Wedd. in DC. Prodr. v. 16, part 1, p. 235³. Stems much-branched. Leaves hispid on the margins, sessile, cordate, acuminate. Perianth in fruit usually 3-winged, the middle wing often thicker than the others. Fl. B. I. v. 5, p. 583. *Pouzolzia ramosissima* (sp.), Wight, Icon. t. 2095, fig. 17, and *P. Dalzellii*, t. 2096, fig. 21.

KONKAN.

3. **Pouzolzia Bennettiana,** *Wight, Icon.* v. 6 (1853) p. 10 and p. 40, t. 1978. Suffruticose; stem erect, suberect or prostrate, sparingly branched, 2–3 ft. high, glabrous or pubescent. Leaves 3–5 by 1¼–1¾ in., opposite or alternately whorled, sessile or very shortly petiolate, not passing into bracts, elliptic-lanceolate, acuminate or caudate, quite entire, more or less pubescent on both surfaces, base rounded or subcordate, somewhat oblique, 3-nerved, the 2 lateral nerves running to the tips of the leaves; stipules persistent. Flowers in dense axillary cymose clusters. MALE FLOWERS: Sepals with a transverse dorsal ridge at the flexure, acuminate. Stamens 5. FEMALE FLOWERS: Fruiting perianth ribbed or with 2–4 membranous, reticulately veined wings. Fl. B. I. v. 5, p. 585; Trim. Fl. Ceyl. v. 4, p. 117; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516.—Flowers: Oct.

DECCAN: Panchgani Ghât, *Cooke!* S. M. COUNTRY: Badami, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

4. **Pouzolzia integrifolia,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 134. Suffruticose, 3–4 ft. high, glabrous or nearly so; stem compressed, grooved. Leaves opposite and alternately whorled, sessile, 2–3½ by ⅜–1 in., triangular-lanceolate, the margins rough with short stout hairs, the upper and lower surfaces more or less pubescent, base broad, truncate, cordate or rounded, subamplexicaul, 3–5-nerved. Flowers in dense axillary clusters, the males numerous, the females few. MALE FLOWERS: Sepals ciliate at the flexure, Stamens 3–4. FEMALE FLOWERS: Fruiting perianth ribbed or sometimes 2–3-winged. Achene ovoid acute, brown, shining. Fl. B. I. v. 5, p. 587; Dalz. & Gibs. p. 240.—Flowers: Oct.

KONKAN: *Law!*, *Stocks!*, *Dalzell!* S. M. COUNTRY: Belgaum, *Ritchie!*—DISTRIB. India (W. Peninsula) apparently endemic.

11. **DEBREGEASIA,** Gaud.

Shrubs or trees. Leaves alternate, petiolate, serrate-crenate, 3-nerved; stipules connate, intrapetiolar, 2-fid. Flowers monœcious or dicœcious, in dense globose paniculate or spicate sessile clusters; bracts of male clusters scarious. MALE FLOWERS: Perianth usually 4 (rarely 3 or 5)-partite; lobes valvate. Stamens usually 4 (rarely 3 or 5), inflexed in bud. Pistillode glabrous or woolly at the base. FEMALE FLOWERS: Perianth ovoid or obovoid, succulent in fruit, the mouth contracted and minutely toothed. Ovary straight, included; ovule erect;

stigma sessile, penicillate. Fruit an achene, at first adnate to the fleshy perianth. Seed with membranous testa; albumen copious or scanty; cotyledons short, broad.—DISTRIB. Tropical Asia and Africa; species 5.

1. **Debregeasia velutina,** *Gaud. in Bot. Voy. Bonite* (1844–6) t. 90. A tall shrub or small tree, erect, branched, the branches rough with warty excrescences and the scars of fallen leaves. Leaves 2–7 by ¾–2 in., lanceolate or oblong-lanceolate, finely acuminate, serrulate, rough and wrinkled above, prominently reticulately veined, white- or ashy-tomentose and softer beneath, base usually rounded; main nerves 3 from the base and 2–3 pairs from the midrib above; petioles ½–1¼ in. long, hairy; stipules chaffy, ¼–⅜ in. long, 2-fid at the apex. Flowers in compact heads arranged in lateral dichotomous cymes; peduncles and pedicels hairy. MALE FLOWERS: Sepals 4. Stamens 4. FEMALE FLOWERS: Perianth tubular, with a small 4-toothed mouth. Stigma sessile, penicillate. Fruit ⅓ in. in diam., consisting of an aggregation of more or less obovoid perianths and their contained achenes, yellow when ripe, somewhat resembling a small raspberry, edible. Fl. B. I. v. 5, p. 590; Wedd. Monog. Urtic. p. 460, t. 15 A, figs. 1–9; Trim. Fl. Ceyl. v. 4, p. 119; Talb. Trees, Bomb. ed. 2, p. 334; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Watt, Dict. Econ. Prod. v. 3, p. 54. *Conocephalus niveus,* Wight, Icon. t. 1959; Dalz. & Gibs. p. 239. *Morocarpus longifolius,* Blume, Mus. Bot. Lugd. Bat. v. 2, p. 156; Bedd. For. Man. in Flor. Sylvat. p. ccxxvi, and Anal. Gen. t. 26, fig. 5. *Bœhmeria ramiflora,* Grah. Cat. p. 187 (*not* of Jacq.).—Flowers: Nov.–Jan. VERN. *Kápsi.*

KONKAN: *Stocks*!, *Talbot*; Ambeghát, *Woodrow*; Konkan and Ghát jungles, *Dalzell & Gibson.* DECCAN: Phonda Ghát, *Ritchie,* 1383!; Mahableshwar, *Law*!, *Cooke*! KANARA: *Law*!, *Talbot.*—DISTRIB. India (outer Himalaya, Assam, Khasia Hills, Birma, W. Peninsula); Ceylon, Java.

12. **PARIETARIA,** Tournef.

Herbs rarely undershrubs. Leaves alternate, entire, 3-nerved; stipules 0. Flowers polygamous, in cymose clusters, the bracts at the base more or less connate into an involucre. MALE FLOWERS: Sepals 3–4, valvate. Stamens 3–4, inflexed in bud. Pistillode glabrous. FEMALE FLOWERS: Perianth tubular, 4-fid. Ovary straight; ovule erect; stigma penicillate. Achene enclosed in the persistent perianth, crustaceous; testa membranous; albumen copious; cotyledons oblong.—DISTRIB. Temperate and tropical regions; species about 8.

1. **Parietaria debilis,** *Forst. f. Prodr.* (1786) p. 73. A diffuse flaccid pubescent herb; stems numerous, 6–18 in. long, very slender, straggling, often matted. Leaves alternate, entire, thin, very variable in shape and size, ½–1½ by ⅜–1 in., broadly ovate or suborbicular, obtuse, base rounded or cuneate; petioles filiform, reaching sometimes 1½ in. long. Flowers minute, polygamous, in axillary 3–7-flowered cymes, male and bisexual flowers few, female flowers numerous; bracts linear, acute, shortly united at the base. MALE FLOWERS: Perianth 4-partite. Stamens 4. FEMALE FLOWERS: Perianth tubular, 4-lobed, enclosing the ovary; lobes acute. Stigma a sessile tuft of hairs. Achene ovoid,

enclosed in the persistent perianth. Fl. B. I. v. 5, p. 593; Wedd. Monog. Urtic. p. 514, t. 17, figs. 21, 22, 23, 24, 25; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516.

Dalzell without locality in Herb. Kew. DECCAN: Junnar Hill (Poona districts), *Kanitkar*! KANARA: *Thomson*!; Karwar, *Talbot*, 42!—DISTRIB. India (Temperate Himalaya from the Panjáb to Sikkim; W. Peninsula); Afghanistan, China, and many temperate and tropical regions, extending to Australia and Chili.

13. **FORSKOHLEA,** Linn.

Herbs sometimes woody at the base. Leaves alternate, toothed, 3-nerved, often hoary beneath; stipules lateral, free. Flowers monœcious, aggregated in a tubular or campanulate 3–6-partite androgynous involucre which is densely woolly within, the male flowers numerous on the periphery of the involucre, the female flowers 1–5 in its centre. MALE FLOWERS: Perianth clavate in bud, in flower irregularly split, 3-lobed or 3-toothed, 1 lobe inflexed. Stamen 1. Pistillode 0. FEMALE FLOWERS: Perianth 0. Ovary straight; ovule erect; stigma filiform, hispid, persistent. Achenes enclosed in the involucre, enveloped in wool, ovate, compressed; testa membranous; albumen scanty or 0; cotyledons broad.—DISTRIB. India, Arabia, Africa, Spain; species 5.

1. **Forskohlea tenacissima,** *Linn. Mant.* (1767) p. 72. Suffruticose; stem 6–24 in. long. Leaves $\frac{1}{2}$–$1\frac{3}{4}$ by $\frac{3}{8}$–$1\frac{1}{2}$ in., variable in shape and size, rhombic, elliptic, orbicular or obovate, obtuse, toothed or serrate, softly hairy with hooked hairs above, white-woolly beneath, base cuneate; petioles $\frac{1}{4}$–$1\frac{1}{4}$ in. long; stipules ovate, acute, scarious, ciliate. Flowers monœcious, in axillary androgynous membranous involucres, the males at the margin, the females 1–4 in the centre of the involucre; bracts usually 5, foliaceous, lanceolate, hispid above, silky below, reaching nearly $\frac{1}{4}$ in. long. MALE FLOWERS: Perianth unequally 3-lobed. Stamen 1. FEMALE FLOWERS: Perianth 0. Achenes $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovoid, compressed, tapering into the filiform style. Fl. B. I. v. 5, p. 593; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517.—Flowers: Feb.

Dalzell without locality in Herb. Kew.! SIND: *Stocks*!; Hala range, *Vicary*!; Shahadpur, *Woodrow*!.—DISTRIB. India (Western Panjáb); Afghanistan, Egypt, Arabia.

14. **STREBLUS,** Lour.

Unarmed shrubs or trees with milky juice. Leaves alternate, penninerved, scabrous; stipules small, lanceolate. Flowers axillary, usually dicecious, the males in pedunculate heads or spikes; female flowers pedicellate, bracteate, solitary or 2–4 together. MALE FLOWERS: Sepals 4, imbricate. Stamens 4, inflexed in bud. Pistillode dilated at the top. FEMALE FLOWERS: Sepals 4, imbricate, embracing the ovary. Ovary straight, retuse; ovule pendulous; style central with very long arms. Fruit membranous, straight, subglobose, laxly covered by the persistent perianth. Seed globose; testa membranous; albumen 0; embryo globose; one cotyledon very large, embracing the smaller and the ascending radicle.—DISTRIB. Species 2, Indian and Malayan.

1. **Streblus asper,** *Lour. Fl. Cochinch.* v. 2 (1790) p. 615. A small rigid gnarled tree with smooth grey bark and numerous interwoven pubescent branchlets. Leaves 1–3½ by ⅝–1¼ in., elliptic or rhomboid, or obovate, acute or acuminate, the margins more or less irregularly toothed in the upper half, roughly scaberulous on both surfaces but especially beneath; main nerves 4–6 pairs; petioles ⅛–⅛ in. long; stipules obliquely lanceolate. Flowers dicœcious, the males in shortly pedunculate globose heads, the females solitary on axillary usually fascicled pedicels ½ in. long. MALE FLOWERS: Perianth campanulate; sepals 4, pubescent outside. Stamens 4. FEMALE FLOWERS: Pedicels slender, thickened upwards. Sepals 4. Ovary straight; style terminal, 2-branched, the arms very long and slender. Fruit pisiform, laxly clothed by the enlarged persistent perianth, yellow, edible. Fl. B. I. v. 5, p. 489; Bedd. For. Man. in Flor. Sylvat. p. ccxxi, & Anal. Gen. t. 26, fig. 1; Talb. Trees, Bomb. ed. 2, p. 323; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 969; Watt, Dict. Econ. Prod. v. 6, part 3, p. 373. *Epicarpurus orientalis,* Blume, Bijdr. (1825) p. 488; Dalz. & Gibs. p. 240; Wight, Icon. t. 1961.—Flowers: Jan.–Mar. VERN. *Kharoti.*

Stocks without locality in Herb. Kew.! DECCAN: Nasik, *Bhiva*! S. M. COUNTRY: Dharwar, *Woodrow*; Belgaum, *Ritchie,* 1374! KANARA: evergreen forests, *Talbot.* GUJARAT: *Woodrow*; Godra, *Cooke!*; Balsar, *Bhiva*!—DISTRIB. Drier parts of India; Ceylon, Malay Islands, Cochinchina, China, Siam.

The rough leaves of the tree are used as sandpaper to polish wood and ivory; the milky juice is used in native medicine and acts as a rennet, rapidly coagulating milk.

15. PLECOSPERMUM, Trécul.

Glabrous trees or shrubs. Leaves alternate, quite entire, penninerved. Flowers dicœcious, in axillary solitary or 2–3-nate pedunculate heads. MALE FLOWERS bracteate. Perianth-lobes 4, concave, imbricate. Stamens 4, inflexed in bud. Pistillode minute, hairy. FEMALE FLOWERS: Perianths fleshy, 4-toothed, connate into a fleshy head. Ovary straight, included; ovule pendulous; style filiform, undivided. Fruit an irregularly-shaped fleshy anthocarp, enclosing a few immersed coriaceous achenes which are adnate to the perianths; albumen 0; embryo subglobose; one cotyledon very large, fleshy, embracing the smaller one; radicle upcurved.—DISTRIB. Species 3, of which 1 is African, the other 2 Indian.

1. **Plecospermum spinosum,** *Trécul, in Ann. Sc. Nat.* sér. 3, v. 8 (1847) p. 124. A large thorny shrub or small tree; branchlets drooping, minutely pubescent; spines stout, axillary, straight. Leaves 2–3 by 1–1½ in., obovate or elliptic, obtuse or acute, glabrous, base narrowed into the petiole; nerves 4–6 pairs, slender; petioles ⅙–⅝ in. long. Flowers dicœcious, in axillary solitary or fascicled heads. MALE FLOWERS: Heads ¼ in. in diam.; peduncles ¼ in. long, often fascicled; flowers distinct, minute, subsessile, pubescent; bracteoles minute. Sepals 4, obtuse or notched, pubescent. Stamens 4, long-exserted. FEMALE FLOWERS: Heads larger than in the male; flowers connate in the heads. Perianth 4-toothed. Fruit pubescent, lobed, ½ in. in diam. Fl. B. I. v. 5, p. 491; Bedd. For. Man. in Flor. Sylvat. p. ccxx, & Anal. Gen. t. 26, fig. 2; Wight, Icon. t. 1963; Trim. Fl. Ceyl. v. 4, p. 103; Talb.

Trees, Bomb. ed. 2, p. 323; Watt, Dict. Econ. Prod. v. 6, part 1, p. 290.—Flowers: Apr.–June.

S. M. COUNTRY: Dharwar district, common in hedges, *Talbot*. KANARA: Bunwasi, Sirsi subdivision of N. Kanara, *Talbot*.—DISTRIB. India (Subhimalayan tract from the Panjáb eastwards, W. Peninsula); Ceylon.

16. **FICUS**, Linn.

Trees or shrubs sometimes scandent or epiphytic (at least primarily); juice milky. Leaves alternate (rarely opposite), entire, lobed, serrate or toothed; stipules clothing the bud, caducous. Flowers minute, 1-sexual, monœcious (very rarely diœcious) on the inner walls of a fleshy receptacle the mouth of which is closed by imbricate bracts; florets often mixed with bracteoles, of four forms, male, female, gall, and (rarely) neuter; receptacles usually androgynous, the males nearest the mouth; males, females, and galls may occur in the same receptacle, or males and galls may be in one set, females and neuters in another, or males and galls in one set, females only in another. MALE FLOWERS: Perianth 2–6-fid or -partite. Stamens 1 or 2 (rarely 3–6), erect in bud. NEUTER FLOWERS: Perianth as in the male. FEMALE FLOWERS: Perianth as in the male or imperfect or obsolete. Ovary straight or oblique; ovule pendulous; style excentric; stigma entire or 2-armed, acute or obtuse. GALL FLOWERS: Perianth as in the female. Ovary containing the pupa of a hymenopterous insect; style short, often dilated upwards. Fruit an enlarged hollow cup-shaped closed receptacle, the inner wall studded with crustaceous or fleshy achenes. Seed pendulous; testa membranous; albumen scanty; embryo curved; cotyledons equal or unequal; radicle ascending.—DISTRIB. Species about 600, mostly tropical.

The Indian Figs have been so minutely described by Sir George King in the Annals of the Royal Botanic Gardens Calcutta [vols. i. and ii. (1888)] that nothing practically has been left for anyone coming after him to do. I have simply adopted, with very slight alteration, Sir George King's descriptions, which are wonderfully clear and accurate.

Pseudo-hermaphrodite; male flowers with 1 stamen and a rudimentary pistil in the same receptacle with the gall flowers; female flowers in a separate receptacle (*Palæomorphe*) ..... 1. *F. gibbosa.*

Unisexual or asexual; male flowers without any rudimentary pistil; male, gall, and female flowers in the same receptacle; stamen 1 (sometimes 2 stamens in *F. callosa*) (*Urostigma*).

Leaves coriaceous or subcoriaceous; petioles short or moderately long, stout, never jointed to the blade.

Receptacles sessile, with 3 basal bracts.

Leaves more or less tomentose.

Leaves obtuse; receptacles puberulous, globose, red, ¾ in. in diam. ..... 2. *F. bengalensis.*

Leaves reaching 8 in. long, shortly acuminate; receptacles oblong or obovate, nearly glabrous when ripe, 1 in. long ..... 3. *F. mysorensis.*

Leaves reaching 5 in. long, bluntly apiculate; receptacles pisiform, less than ½ in. in diam., grey-tomentose ..... 4. *F. tomentosa.*

Leaves glabrous.

Receptacles yellow or reddish, ½ in. in diam.; basal bracts blunt; petioles ¼–½ in. long ..... 5. *F. retusa.*

Receptacles greenish-yellow, dotted, ½ in. in diam.; basal bracts acute; petioles ¾–1 in. long ..... 6. *F. Talboti.*

Receptacles in pairs on distinct slender peduncles ½–⅝ in. long, without basal bracts, but with 3 small bracts low down on the peduncle ..... 7. *F. nervosa.*

Leaves subcoriaceous or membranous on long slender petioles which are sometimes jointed to the blade.

Apices of leaves more or less caudate-acuminate.

Bases of leaves slightly narrowed to the petiole, 5-nerved; apical tail ¼ as long as the main part of the blade; receptacles not depressed at the apex ... 8. *F. Rumphii.*

Bases of leaves not narrowed to the petiole, rounded or truncate, 5–7-nerved; apical tail ½ as long as the main part of the blade; receptacles depressed at the apex ..... 9. *F. religiosa.*

Bases of leaves cordate; apex shortly caudate-acuminate ..... 10. *F. Arnottiana.*

Apices of leaves not caudate-acuminate.

Receptacles sessile, in groups of about 4 from tubercles (shortened branches) ..... 11. *F. Tsjakela.*

Receptacles sessile, in pairs, axillary; stamen 1.

Primary nerves of leaves indistinct; male perianth of 3 sepals ..... 12. *F. Tsiela.*

Primary nerves of leaves distinct; male perianth of 4 or 5 sepals ..... 13. *F. infectoria.*

Receptacles on a peduncle ⅜ in. long; stamens sometimes 2 ..... 14. *F. callosa.*

Unisexual; male and gall flowers in one set of receptacles; fertile female flowers in another (in *1. glomerata* all three kinds of flowers in the same receptacle).

Male flowers with 1 stamen.

Receptacles axillary, solitary; basal bracts minute or 0; small trees, shrubs, or climbers with alternate leaves.

A creeping shrub; bracts minute, basal or high up on the peduncle ..... 15. *F. heterophylla.*

An erect shrub; basal bracts 0 ..... 16. *F. asperrima.*

Receptacles in some individuals all axillary, in others all on branches from the stem near the root, in others occupying both situations; basal bracts 3; erect or spreading shrubs or trees usually with opposite leaves, all parts hispid-pubescent ..... 17. *F. hispida.*

Male flowers with 2 stamens.

Receptacles pedunculate, all in fascicles from the stem or branches; basal bracts 3 (*Neomorphe*); a tree with alternate leaves ..... 18. *F. glomerata.*

1. **Ficus gibbosa,** *Blume, Bijdr.* (1825) p. 466. VAR. **parasitica,** *King, Sp. Fic.* (1888) p. 6, t. 2 b, fig. B. A small or sometimes a large tree often epiphytic or climbing, enclosing the trunks of trees in a network of branches or creeping along old walls and on the sides of wells. Leaves 3–6 in. long, thinly coriaceous, more or less rhomboid or subrhomboid, minutely hispid above, scabrid and minutely hispid beneath, obtuse, acute or acuminate, base acute, often unequal-sided; main nerves 3–7 pairs, prominent beneath, pale and shining; petioles ⅓–½ in. long; stipules ⅓–½ in. long, ovate-lanceolate, slightly curved. Receptacles pedunculate, solitary or in pairs or fascicled, axillary and from below the leaves, depressed-globose or globose-pyriform, mammillate, with rather a prominent umbilicus, minutely verrucose, subscabrid, without basal bracts, yellow when ripe, ⅙–⅓ in. across; peduncles ⅙–½ in. long, bracteate at the base. MALE FLOWERS: only near the mouth of the receptacles containing gall flowers. Sepals 4–6, linear, fleshy, hairy. Stamen 1; filament short, united by its base to an abortive (insect-attacked) pistil. GALL FLOWERS:

Perianth as in the male. Ovary globose, smooth; style short, lateral. FERTILE FLOWERS in separate receptacles. Sepals 4, slightly hairy. Style elongate, lateral. Achenes slightly papillose, obliquely ovoid. Fl. B. I. v. 5, p. 497; Prain, Beng. Pl. p. 972; Watt, Dict. Econ. Prod. v. 3, p. 351. *Ficus gibbosa*, Talb. Trees, Bomb. ed. 2, p. 326; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515. *F. parasitica* (sp.), Kœn. ex Willd. in Mém. Acad. Berol. 1798 (1801) p. 102; Bedd. For. Man. in Flor. Sylvat. p. ccxxiv. *F. Ampelos*, Kœn. in Roxb. Hort. Beng. (1814) p. 103 (*not* of Burm.); Wight, Icon. t. 652. *Urostigma Ampelos*, Dalz. & Gibs. Bo. Fl. (1861) p. 315. *Urostigma volubile*, Dalz. & Gibs. Bo. Fl. (1861) p. 242.—Fruit ripe Apr.–May. VERN. *Dâtir*.

Throughout the Presidency, tolerably common.—DISTRIB. India (Behar, Central India, W. Peninsula).

The leaves are used to polish ivory, and the root-bark is employed in native medicine. See Watt, Dict. Econ. Prod. l. c.

2. **Ficus bengalensis,** *Linn. Hort. Cliff.* (1737) p. 471, no. 4, *& Sp. Pl.* (1753) p. 1059. A very large tree reaching 100 ft. high, sending down many aërial roots from the branches and thus extending the growth of the tree indefinitely; young parts softly pubescent. Leaves coriaceous, 4–8 by 2–5 in., ovate or orbicular-ovate to elliptic, obtuse, entire, glabrescent above, glabrous or minutely pubescent beneath, base rounded or subcordate, 3–7-nerved with about 5–7 pairs of lateral nerves above the basal ones and distinct reticulate venation between; peduncles ½–2 in. long, stout; stipules ¾–1 in. long, coriaceous. Receptacles about ¾ in. in diam., sessile in pairs, axillary, globose, puberulous, red when ripe, with 3 broad rounded nearly glabrous coriaceous basal bracts. MALE FLOWERS rather numerous near the mouth of the receptacles. Sepals 4, lanceolate. Stamen 1. GALL FLOWERS: Perianth as in the male. Style short. FERTILE FLOWERS: Perianth shorter than in the male. Style elongate. Fl. B. I. v. 5, p. 499; J. Commel. Hort. Med. Amstel. Rar. Pl. Hist. v. 1 (1697) p. 119, t. 62; Bedd. For. Man. in Flor. Sylvat. p. ccxxii; King, Sp. Fic. p. 18, t. 13 & t. 81, fig. C; Trim. Fl. Ceyl. v. 4, p. 86; Talb. Trees, Bomb. ed. 2, p. 326; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 973; Watt, Dict. Econ. Prod. v. 3, p. 343. *Ficus indica*, Linn. Amœn. Acad. ed. 3, v. 1, (1787) p. 27; Grah. Cat. p. 189. *Urostigma bengalense*, Gasp. Nov. Gen. Fic. p. 7; Wight, Icon. t. 1989; Dalz. & Gibs. p. 240.—Fruit ripe Apr.–June. VERN. *Wad*.

The tree, known to Anglo-Indians as the *Banyan-tree*, is widely planted, often near temples and shrines. It is an object of veneration among Hindus. From its property of extending indefinitely by means of its aërial roots many of the trees attain a large size. A celebrated tree known as the *Kabir Bar* grows on an island in the Narbada river opposite the village of Sukiltirat about 12 miles above Broach, and a very large tree may be found near Jaoli, a village in the Sattara Collectorate. The measurements of this latter tree taken in 1882 by Mr. (now Sir William) Lee Warner are given by Sir G. King (*l. c.*) and are as follows:—Circumference of head 1587 ft.; length from North to South 595 ft., and from East to West 442 ft. The plant is not found wild in the Bombay Presidency. Sir G. King states that it is "really wild only in the Sub-himalayan forests and on the lower slopes of the hill-ranges in Southern India."

3. **Ficus mysorensis,** *Heyne, in Roth, Nov. Pl. Sp.* (1821) p. 390. A tree with a shady head, often leafless when in ripe fruit (*Talbot*); aërial roots few, embracing the stem; young branches with grey or rufous flocculent tomentum, afterwards glabrous; stem usually short;

bark thick, grey, rough. Leaves coriaceous, 3½–8 by 2½–5 in., ovate or elliptic, shortly and abruptly acuminate, entire, glabrous and minutely dotted above, at first flocculent-tomentose, afterwards nearly glabrous beneath; base rounded or cordate, 3–5-nerved, with 10–13 pairs of lateral nerves above the basal ones; petioles stout, ¾–1¼ in. long; stipules ¼–½ in. long, broadly triangular, flocculent-tomentose. Receptacles sessile in pairs, axillary, oblong to subobovate, truncate or slightly depressed at the apex, flocculent-tomentose when young, nearly glabrous, 1 in. long, orange-red when ripe, with 3 broadly trangular blunt spreading basal bracts. MALE FLOWERS near the apex of the receptacle, rather numerous, pedicellate. Stamen 1; anther-cells subglobular. Sepals 4. GALL FLOWERS broad, smooth. Style short, subterminal. FERTILE FLOWERS: Sepals 4. Style elongate, lateral. Achenes ovoid. Fl. B. I. v. 5, p. 500; Bedd. For. Man. in Flor. Sylvat. p. ccxxiii; Trim. Fl. Ceyl. v. 4, p. 86; King, Sp. Fic. p. 19, t. 14 & t. 81, fig. D; Talb. Trees, Bomb. ed. 2, p. 327; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Watt, Dict. Econ. Prodr. v. 3, p. 356.—Fruit ripe Apr.–May. VERN. *Burali-Wad.*

KONKAN: along the Ghâts, *Talbot.* DECCAN: Lanóli, *Woodrow*! S. M. COUNTRY: Dharwar, *Woodrow*; Belgaum, *Ritchie*, 693!—DISTRIB. India (Sikkim, Khasia Mountains, Birma, W. Peninsula); Ceylon.

VAR. *pubescens*, King, Sp. Fic. p. 20. Leaves smaller with fewer lateral nerves and often with repand margins; tomentum denser, larger, more copious and of a deep rusty-red colour especially on the young parts. Fl. B. I. v. 5, p. 500. *Ficus pubescens* (sp.), Roth, Nov. Pl. Sp. (1821) p. 387. *Urostigma dasycarpum*, Miq. in Hook. Lond. Journ. Bot. v. 6 (1847) p. 574; Dalz. & Gibs. p. 242.

Dalzell without locality in Herb. Kew.! KONKAN: *Dalzell & Gibson, Law*! KANARA: *Law*!

4. **Ficus tomentosa,** *Roxb. Hort. Beng.* (1814) p. 103. A large shady tree with thin aërial roots from the branches; young parts clothed with rusty-grey tomentum; bark white, scaly. Leaves crowded towards the ends of the branches, coriaceous, 2–5 by 1–3 in., ovate-elliptic or obovate-elliptic, bluntly apiculate, entire, glabrous or nearly so and dotted above, softly and densely rusty-grey tomentose beneath, base rounded or cordate, 3–7-nerved, with about 5 pairs of lateral nerves above the basal ones; petioles ¾–1 in. long; stipules ⅓–½ in. long, densely woolly on the back. Receptacles sessile in pairs, axillary, pisiform, grey-tomentose, ¼–⅖ in. in diam.; apical scales small, glabrous; basal bracts 3, large, spreading, pubescent, sometimes 3-fid when young. MALE FLOWERS few, near the mouth of the receptacle. Sepals 4, lanceolate. Stamen 1. GALL FLOWERS: Sepals 4, shorter than the ovary. Ovary smooth; style short. FERTILE FLOWERS: Sepals 4, shorter than the ovary. Style elongate. Achenes tuberculate. Fl. B. I. v. 5, p. 501; Wight, Icon. t. 647; Bedd. For. Man. in Flor. Sylvat. p. ccxxiii; King, Sp. Fic. p. 22, t. 18 & t. 81, fig. G; Trim. Fl. Ceyl. v. 4, p. 87; Talb. Trees, Bomb. ed. 2, p. 327; Prain, Beng. Pl. p. 973.—Fruit ripe Mar.–Apr. VERN. *Kallu-goli.*

KONKAN: near the coast, *Talbot.* S. M. COUNTRY: on sandstone rocks near Badami, *Talbot.* KANARA: Yellapur, *Talbot*, 509!; Karwar, *Talbot!*; Kála naddi, *Ritchie*, 1378!—DISTRIB. India (Gangetic plain, Behar, Central India); Ceylon.

5. **Ficus retusa,** *Linn. Mantiss.* (1767) p. 129. A moderate-sized shady tree, all parts glabrous; aërial roots usually few, sometimes absent (*Talbot*). Leaves coriaceous, 2–4 in. long and nearly as broad, elliptic, ovate or obovate, rounded or shortly and bluntly acuminate at the apex, polished and shining, base narrowed into the petiole, 3-nerved, with 5–6 pairs of main lateral nerves above the basal ones, not more prominent than the secondary nerves, reticulately veined between; petioles ¼–½ in. long; stipules lanceolate, ⅖ in. long. Receptacles small, about ⅓ in. in diam., sessile in pairs, axillary or from the scars of fallen leaves, depressed-globose, smooth, yellow or reddish when ripe; basal bracts 3, broadly ovate, blunt, spreading, persistent. MALE FLOWERS numerous, scattered, sessile or shortly pedicellate. Sepals 3, subspathulate. Stamen 1; filament as long as the cordate apiculate anther. GALL FLOWERS sessile or pedicellate. Sepals 3, oblong or broadly spathulate. Style short. FERTILE FLOWERS usually sessile. Sepals 3, much shorter than in the gall flowers. Style short; stigma cylindric or clavate. Achenes ovoid or obovoid. Fl. B. I. v. 5, p. 511; Bedd. For. Man. in Flor. Sylvat. p. ccxxiii; King, Sp. Fic. p. 50, t. 61 & t. 84, fig. P; Trim. Fl. Ceyl. v. 4, p. 89; Talb. Trees, Bomb. ed. 2, p. 328; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Watt, Dict. Econ. Prod. v. 3, p. 360. *Ficus Benjamina,* Willd. Sp. Pl. v. 4, p. 1143 (*not* of Linn.); Roxb. Fl. Ind. v. 3, p. 550; Grah. Cat. p. 191. *Urostigma nitidum,* Miq. in Hook. Lond. Journ. Bot. v. 6 (1847) p. 582; Dalz. & Gibs. p. 242. *Urostigma retusum,* Gasp. Nov. Gen. Fic. (1844) p. 7; Dalz. & Gibs. p. 241.—VERN. *Nándruk.*

Throughout the Bombay Presidency, often planted as a roadside tree, a purpose for which it is well adapted owing to the dense shade it affords.

6. **Ficus Talboti,** *G. King, Sp. Fic. in Ann. Roy. Bot. Gard. Calc.* v. 1 (1888) p. 51, t. 63 & t. 84, fig. Q. A large tree, all plants glabrous; milky juice abundant, that of the young branches yellowish (*Talbot*); bark grey, smooth. Leaves thinly coriaceous, 3½–4 in. long, ovate or elliptic, shortly caudate-acuminate, entire, smooth and shining, base narrowed, 3–5-nerved; main lateral nerves 6–9 pairs above the basal ones, rather prominent on both surfaces; petioles ¾–1 in. long; stipules ovate, ¼ in. long. Receptacles sessile in pairs, axillary, obovoid, rather depressed at the apex, smooth, about ¼ in. across, when ripe greenish-yellow, dotted (*Talbot*), basal bracts 3, ovate, acute. MALE FLOWERS few, only near the mouth of the receptacle, sessile. Sepals 3, broadly ovate. Stamen 1; filament short. GALL FLOWERS sessile or pedicellate. Sepals 3, lanceolate. Ovary ovoid, narrowed at each end; style terminal. FERTILE FLOWERS: Perianth as in the gall flowers. Style short, lateral. Achenes ovoid or obovoid, minutely tuberculate. Fl. B. I. v. 5, p. 512; Talb. Trees, Bomb. ed. 2, p. 328; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515.—Fruit ripe Dec.–Jan.

S. M. COUNTRY: evergreen forests of Belgaum, *Talbot.* KANARA: Southern Ghâts of N. Kanara, *Talbot.*—DISTRIB. India (W. Peninsula), apparently endemic.

7. **Ficus nervosa,** *Heyne, in Roth, Nov. Pl. Sp.* (1821) p. 388. A very large tree without aërial roots (*Talbot*); milky juice pearly white (*Talbot*); trunk cylindric; bark smooth, dark-colored; young parts minutely appressedly pubescent. Leaves thinly coriaceous, 3½–8 by 1¼–3 in., elliptic, oblong-lanceolate to obovate-elliptic or oblanceolate,

abruptly and narrowly acuminate, the acumen ½–1 in. long, with entire slightly undulate and revolute margins, shining on both surfaces, the lower minutely tuberculate, base narrowed (rarely rounded), subequilateral, 3–5-nerved, lateral main nerves 7–10 pairs, nearly at right angles to the midrib, prominent beneath; petioles ½–¾ in. long; stipules lanceolate or ovate-lanceolate, membranous, puberulous, about ½ in. long. Receptacles pedunculate in pairs, axillary, slightly verrucose when young, when ripe yellow, depressed-globose, ¼–¾ in. in diam., puberulous; peduncles ½–⅔ in. long, slender, pubescent; bracts at base of receptacle 0, at base of peduncle 3, small, ovate-rotund, pubescent. MALE FLOWERS few, only near the mouth of the receptacle. Sepals 2, unequal, spathulate. Stamen 1; anther single, attached by a filament as long as itself to one of the sepals. GALL FLOWERS sessile or pedicellate. Sepals 3, elongate, acuminate. Ovary ovoid, smooth; style short. FERTILE FLOWERS usually sessile. Sepals 3, lanceolate. Achenes ovoid, acuminate. Style twice as long as the achene; stigma clavate. Fl. B. I. v. 5, p. 512; Bedd. For. Man. in Flor. Sylvat. p. ccxxiii; King, Sp. Fic. p. 53, t. 65; Trim. Fl. Ceyl. v. 4, p. 89; Talb. Trees, Bomb. ed. 2, p. 328; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 974.—Fruit ripe Feb.

KONKAN: *Stocks!*, *Law!* DECCAN: Lanoli, *Woodrow*. KANARA: evergreen forests of N. Kanara from Supa southwards, *Talbot*; Kadgal (N. Kanara), *Talbot*, 245!—DISTRIB. India (Sikkim and Bhutan Himalaya, Khasia, Assam, Birma, W. Peninsula); Ceylon, Malayan Peninsula and Archipelago, China.

The figure 660 in Wight's 'Icones' has been incorrectly cited by Sir G. King (*l. c.*) and in the 'Flora of British India' as *Ficus nervosa*. The figure in the 'Icones' is that of *Ficus angustifolia*, Roxb. (non *F. glaberrima*, Blume). Wight's figure agrees with Roxburgh's unpublished drawing.

In the 'Flora of British India' (*l. c.*) a curious mistake occurs which has been perpetuated in Trimen's 'Flora of Ceylon' (*l. c.*). The leaves are said to be ½–1 in. long. Sir G. King (*l. c.*) describes the *acumen* of the leaves as ½–1 in. long, and this measurement has been apparently taken for the *blade* in the publications named.

8. **Ficus Rumphii,** *Blume, Bijdr.* (1825) p. 437. A moderate-sized deciduous tree at first usually epiphytic, all parts glabrous. Leaves subcoriaceous, 3–6 by 2–3¾ in., broadly ovate, with an acumen ⅕–⅙ as long as the blade, and entire subundulate margins, glabrous, shining, base broad, truncate, slightly narrowed towards the petiole (rarely subcordate), 5-nerved; lateral main nerves 3–6 pairs, rather irregular, prominent only in the young leaves which are red just after unfolding, the venation between the nerves finely reticulate; petioles 2½–3½ in. long; stipules ovate-lanceolate, ½–1 in. long. Receptacles sessile, in pairs, axillary or from old scars, globular, not depressed at the apex, smooth, ½ in. in diam. when ripe, when young whitish with dark spots, when ripe nearly black; basal bracts 3, rotund, small. MALE FLOWERS few, only near the mouth of the receptacle. Sepals 3, spathulate. Stamen 1; anther single on a filament as long as itself. GALL and FERTILE FLOWERS: Sepals 3, lanceolate; gall ovary smooth, usually obovoid. Achenes minutely tuberculate, mucilaginous. Style in both elongate; stigma clavate. Fl. B. I. v. 5, p. 512; King, Sp. Fic. p. 54, t. 67 B & t. 84, fig. T; Talb. Trees, Bomb. ed. 2, p. 328; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 974; Watt, Dict. Econ. Prod. v. 3, p. 361. *Ficus cordifolia*, Roxb. Fl. Ind. v. 3 (1832) p. 548 (*not* of Blume); Wight, Icon. t. 640. *Urostigma*

cordifolium, Miq. in Hook. Lond. Journ. Bot. v. 6 (1847) p. 564.—Fruit ripe May–June. VERN. *Pair*; *Ashta.*

KONKAN: Western Ghâts, *Woodrow, Dalzell & Gibson.* DECCAN: Khandala, pretty common, *Graham*; Mahableshwar, *Cooke !, H. M. Birdwood.*—DISTRIB. India (Panjâb, N. India, Assam, Birma, Central India, W. Peninsula); Malayan Peninsula and Archipelago.

9. **Ficus religiosa,** *Linn. Sp. Pl.* (1753) p. 1059. A large glabrous usually epiphytic tree. Leaves coriaceous, 4–7 by 3–4 in., ovate-rotund, narrowed upwards and the apex produced into a linear-lanceolate tail about $\frac{1}{2}$ as long as the main portion of the blade ($\frac{1}{3}$ as long as the whole blade), entire, base broad, rounded, truncate, sometimes in young leaves cordate, 5–7-nerved; lateral main nerves about 8 pairs with finely reticulate venation between; petioles 3–4 in. long, slender; stipules minute, ovate, acute. Receptacles in pairs, axillary, sessile, smooth, depressed-globose, $\frac{1}{2}$ in. in diam.; dark-purple when ripe; basal bracts broad, spreading. MALE FLOWERS few, only near the mouth of some receptacles (absent in others), sessile. Sepals 3, broadly ovate. Stamen 1; anther single, ovate-rotund; filament short. GALL and FERTILE FLOWERS sessile or pedicellate, the gall flowers much more numerous than the fertile females, many of them without perianth. Sepals 5, lanceolate. Style short, lateral; stigma rounded. Fl. B. I. v. 5, p. 513; Bedd. Flor. Sylvat. t. 314; Grah. Cat. p. 190; King, Sp. Fic. p. 55, t. 67 A & t. 84, fig. U; Talb. Trees, Bomb. ed. 2, p. 328; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 974; Watt, Dict. Econ. Prod. v. 3, p. 357. *Urostigma religiosum*, Gasp. Ricer. Caprif. (1845) p. 82, t. 7, figs. 1–5; Wight, Icon. t. 1967; Dalz. & Gibs. p. 241. —Fruit ripe May–July. VERN. *Pipal.*

Universally planted but not wild in the Bombay Presidency. According to Sir George King it is truly wild in the Subhimalayan forests, in Bengal, and in Central India. The tree is held in great veneration by the Hindus. It is extremely destructive to neglected buildings; when once rooted in the joints of the masonry it rapidly disrupts them.

10. **Ficus Arnottiana,** *Miq. Ann. Mus. Lugd. Bat.* v. 3 (1867) p. 287. A glabrous tree or shrub. Leaves subcoriaceous, 3–8 by 2–6 in., broadly ovate, narrowed upwards to the shortly caudate-acuminate apex, with entire margins, base usually cordate, never narrowed to the petiole, 7-nerved; lateral main nerves 5–7 pairs, with minute lucid reticulation between; petioles 2–6 in. long; stipules ovate-lanceolate, $\frac{1}{2}$–1 in. long, caducous, reddish-brown when dried. Receptacles mostly from the axils of fallen leaves, in pairs or clusters from tubercles, sessile or shortly pedunculate, depressed-globose, smooth, $\frac{1}{4}$–$\frac{3}{8}$ in. in diam., purple with greenish dots when ripe; basal bracts 3, brown, membranous; peduncles when present $\frac{1}{10}$–$\frac{1}{5}$ in. long. MALE FLOWERS few, near the mouth of the receptacles, sessile. Sepals 3, loose, inflated, broadly acuminate, larger than the small subsessile solitary anther. GALL and FERTILE FLOWERS undistinguishable except by the contents of the ovary, sessile or pedicellate, the perianth gamophyllous, lax, toothed at the apex, completely investing the ovary. Style elongate; stigma flat. Fl. B. I. v. 5, p. 513; King, Sp. Fic. p. 56, t. 68 & t. 84, fig. V; Trim. Fl. Ceyl. v. 4, p. 90; Talb. Trees, Bomb. ed. 2, p. 329; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 974. *Urostigma cordifolium*, Dalz. & Gibs. p. 242

(*not* of Miq.). *Ficus cordifolia*, Grah. Cat. p. 192 (*not* of Roxb.).—Fruit ripe Feb.–Apr. VERN. *Pair.*

KONKAN: on rocks near the coast, *Talbot*; W. Ghâts, *Woodrow, Dalzell & Gibson*; Matheran, *Cooke*!; Khandala, *Graham.* KANARA: on rocks on the coast and also in moist forests, *Talbot*; Kumpta, near the Yena rocks, *Talbot.*—DISTRIB. India in rocky places (Rajputana, Central Provinces, Behar, W. Peninsula); Ceylon.

11. **Ficus Tsjakela,** *Burm. Fl. Ind.* (1768) p. 227. A large glabrous tree without aërial roots, leafless for a time during the dry season; bark rough, dark-colored. Leaves very glossy above, coriaceous, 3–7½ by 1½–3 in., ovate-oblong, shortly and abruptly acuminate, with entire slightly undulate margins, base broad, rounded or subtruncate, 3–5-nerved; lateral main nerves 7–10 pairs, slightly prominent on both surfaces; petioles 1–2¼ in. long, slender; stipules small, ovate-lanceolate, ½ in. long; leaf-scales of the young branches large, linear-lanceolate, flaccid, caducous, 3–5 in. long. Receptacles in clusters of 2–6, on very short crowded tubercles (abortive branchlets), in the axils of the leaves or more frequently in the axils of the scars of fallen leaves, sessile (rarely very shortly pedunculate), depressed-globose, ⅓ in. in diam., whitish-yellow, dotted when ripe; basal bracts 3, broad, deeply 2-fid. MALE FLOWERS few, near the mouth of the receptacle, sessile. Sepals 3, ovate, shorter than the single stamen. Filaments as long as or longer than the ovate anther. GALL and FERTILE FLOWERS alike except as regards the contents of the ovary. Sepals 3–4. Fertile achenes obovate. Style elongate; stigma cylindric. Fl. B. I. v. 5, p. 514; King, Sp. Fic. p. 57, t. 70 & t. 84, fig. X; Trim. Fl. Ceyl. v. 4, p. 91; Talb. Trees, Bomb. ed. 2, p. 329; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515. *Ficus infectoria*, Willd. Sp. Pl. v. 4 (1805) p. 1137 (*not* of Roxb.). *Ficus venosa*, Ait. Hort. Kew. ed. 1, v. 3 (1789) p. 451 (*not* of Willd.).—Fruit ripe Mar.–May. VERN. *Kel.*

Stocks without locality in Herb. Kew. KANARA: abundant in the forests of Yellapur and generally on the Ghâts of N. Kanara, *Talbot*; Sirsi, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

12. **Ficus Tsiela,** *Roxb. Fl. Ind.* v. 3 (1832) p. 549. A large spreading tree without aërial roots, all parts glabrous. Leaves thinly coriaceous, 3–6 by 1½–3½ in., broadly ovate or elliptic-lanceolate, acute or obtusely cuspidate, with entire margins, base narrowed or rounded, 3-nerved; main lateral nerves (indistinct till the leaf is dry) about 8–10 pairs with reticulate venation between; petioles 1½–2 in. long; stipules ½–1 in. long, ovate, acuminate. Receptacles crowded towards the ends of the branches, axillary or from leaf-scars, sessile, globose, about ½ in. in diam., smooth and purple when ripe; basal bracts 3, minute, broadly ovate, scarious. MALE FLOWERS sessile. Sepals 3, ovate, acuminate, longer than the single stamen; anther broadly ovate; filament thick, clavate, larger than the anther. GALL and FERTILE FLOWERS: Sepals 3, ovate. Achenes ovoid-reniform, the fertile broader than the gall ones. Style in both long; stigma very long, cylindric. Fl. B. I. v. 5, p. 515; Grah. Cat. p. 191; King, Sp. Fic. p. 59, tt. 73, 74 & t. 84, fig. Z, 2; Trim. Fl. Ceyl. v. 4, p. 92; Talb. Trees, Bomb. ed. 2, p. 329; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Watt, Dict. Econ. Prod. v. 3, p. 362. *Ficus Tsiala*, Wight, Icon. t. 668; Bedd. Flor. Sylvat. t. 314. *Urostigma pseudo-Tjiela*, Miq. in Hook. Lond. Journ. Bot. v. 6

(1847) p. 566; Dalz. & Gibs. p. 241.—Fruit ripe Apr.-Oct. VERN. *Pipri.*

Stocks without locality in Herb. Kew.! Western Peninsula from the Konkan southwards. Widely planted as a roadside or avenue tree, for which it is well adapted.—DISTRIB. India (Central Provinces, W. Peninsula); Ceylon.

13. **Ficus infectoria,** *Roxb. Fl. Ind.* v. 3 (1832) p. 551 (*exclud. Syn. Rheede*) (*not* of Willd.). A large spreading deciduous fast-growing tree, all parts glabrous; bark grey, smooth, scaly. Leaves membranous, 3½–5 by 2–2½ in., ovate or ovate-oblong, shortly and rather abruptly acuminate, with entire, subundulate margins; base usually rounded, slightly cordate, or sometimes narrowed or acute, 3-nerved; lateral main nerves 5–7, not very prominent; petioles 1½–2¼ in. long, sometimes indistinctly jointed with the blade; stipules about ½ in. long, broadly ovate, acute, pubescent. Receptacles axillary, in pairs, sessile, globose, ¼ in. in diam., whitish, flushed with red and dotted when ripe; basal bracts 3, ovate-rotund, minute. MALE FLOWERS few, sessile near the mouth of the receptacles. Stamen 1; anther broadly ovate; filament short. Sepals 4 or 5. GALL and FERTILE FLOWERS: Perianth as in the male. Style of fertile female flowers long, of the gall flowers short; stigma elongate. Fl. B. I. v. 5, p. 515; Grah. Cat. p. 191; Bedd. For. Man. in Flor. Sylvat. p. ccxxii (*exclud. syn.*); Wight, Icon. t. 665; King, Sp. Fic. p. 60, t. 75 & t. 84, fig. Y, 2; Trim. Fl. Ceyl. v. 4, p. 92; Talb. Trees, Bomb. ed. 2, p. 329; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 975; Watt, Dict. Econ. Prod. v. 3, p. 355. *Ficus lacor*, Buch.-Ham. in Linn. Trans. v. 15 (1827) p. 150. *Urostigma infectorium*, Miq. Fl. Ind. Bat. v. 1, part 2 (1859) p. 339; Dalz. & Gibs. p. 241.—VERN. *Bassári*; *Pipli.*

KONKAN: *Law!*, *Stocks!*, *Dalzell & Gibson.* KANARA: *Talbot.* Often planted along roadsides in the Presidency, but not very common in a wild state.—DISTRIB. India (plains and lower hills, Bengal, Assam, Birma, E. and W. Peninsulas); Ceylon, Malaya.

The oldest name for this plant is *Ficus lacor*, Buch.-Ham. (1825), for although Roxburgh has published *Ficus infectoria* as a species in Hort. Beng. (1814) p. 66, he has there founded the species on Rheede, Hort. Mal. v. 3, p. 64, which is *Ficus Tsjakela.*

VAR. 1. *Lambertiana*, King, Sp. Fic. p. 63, t. 76. Leaves more coriaceous, the base broad, rounded, emarginate or subcordate (rarely narrowed); receptacles ⅓–⅔ in. in diam. on pubescent peduncles ⅕–⅓ in. long. Fl. B. I. v. 5, p. 516; Prain, Beng. Pl. p. 975. *Ficus Lambertiana* (sp.), Miq. Ann. Mus. v. 3, p. 286. *Urostigma Lambertianum*, Miq. in Hook. Lond. Journ. Bot. v. 6 (1847) p. 565; Dalz. & Gibs. p. 241.

KONKAN: *Law!*, *Stocks!*, *Lambert.* KANARA: *Talbot*; on the Kála naddi near Jagalbet, *Ritchie*, 685!

VAR. 2. *Wightiana*, King, Sp. Fic. p. 63, t. 77. Leaves smaller than in the type (often only 2½ in. long), narrowed at the base. Receptacles large for the size of the leaves, on glabrous or pubescent peduncles about ½ in. long. Fl. B. I. v. 5, p. 516. *Ficus Wightiana* (sp.), Wall. Cat. 4540; Bedd. For. Man. in Flor. Sylvat. p. ccxxii.

KANARA: southern parts of N. Kanara, *Talbot.*

14. **Ficus callosa,** *Willd. in Mém. Acad. Berl.* (1798) p. 102. A large evergreen tree 40–60 ft. high, with pearly-white juice and

without aërial roots; branchlets hoary, warted. Leaves 4–9 by 2–5½ in. (in barren shoots often 12 in. long or more), of a rigid hard coriaceous texture, elliptic, obtuse, or with a short blunt acumen, with entire slightly recurved margins, smooth and shining above, beneath pale, pubescent when young, scaberulous but glabrous when old, strongly reticulate, base broad, rounded or sometimes slightly narrowed to the petiole, 3–5-nerved; lateral main nerves 5–12 pairs, thin, but prominent below, as are the reticulations; petioles 1¼–2 in. long; stipules ovate-lanceolate, nearly ½ in. long, pubescent. Receptacles pedunculate, solitary, axillary, subglobose, when ripe yellow and 1–1¼ in. in diam., slightly depressed at top and contracted at the base into a short stalk, at the junction of which with the peduncle are 3 broadly ovate pubescent bracts; peduncle ¾ in. long, pubescent or scabrid; flowers intermixed with numerous ovate-lanceolate bracteoles which rise from the interior of the receptacle along with them. MALE FLOWERS rather numerous, scattered, pedicellate. Sepals 3, spathulate. Stamens 1 or 2; filaments short, slender; anthers small, ovate. GALL and FERTILE FLOWERS similar. Perianth deeply 3–4-cleft; segments broadly lanceolate. Style elongate; stigma deeply 2-fid. Ripe achenes obovoid. Fl. B. I. v. 5, p. 516; King, Sp. Fic. p. 64, t. 85 & t. 84, fig. V, 2; Trim. Fl. Ceyl. v. 4, p. 93; Talb. Trees, Bomb. ed. 2, p. 330; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515.—Fruit ripe June–July.

KANARA: N. Kanara, *Talbot*, 414!, *Woodrow*; Usheli (N. Kanara), *Ritchie*!—DISTRIB. India (Birma, Andamans, W. Peninsula); Ceylon, Java.

15. **Ficus heterophylla,** *Linn. f. Suppl.* (1781) p. 442. A shrub, sometimes creeping along the ground or over rocks; branchlets shortly pubescent. Leaves polymorphous, petiolate, membranous, ovate or orbicular-ovate to lanceolate, more or less acuminate, entire or 3-many-lobed, both surfaces scabrous, the margins irregularly and coarsely toothed or repand-dentate, base rounded or cordate, 3–5-nerved; lateral main nerves 4–8 pairs, arched, or in much-lobed leaves palmate; petioles ½–2½ in. long; stipules 2 to each leaf, ⅓–½ in. long, ovate, scarious. Receptacles pedunculate, solitary, axillary, spherical to pyriform, more or less hispid scabrid or warted when young, when ripe nearly smooth, dark-orange, always with a more or less prominent mammillate umbilicus which is imperfectly closed by bracts; peduncles ½–1 in. long; bracts basal or high up on the peduncle, minute, triangular, glabrous. Perianth of all flowers 3–4-cleft. MALE FLOWERS: Stamen 1. GALL FLOWERS: Ovary ovoid, smooth; style short, lateral. FERTILE FLOWERS: Perianth hyaline, viscid, tuberculate. Achenes subglobose. Style long, lateral; stigma cylindric. Fl. B. I. v. 5, p. 518; Grah. Cat. p. 191; Dalz. & Gibs. p. 243; Wight, Icon. t. 659; King, Sp. Fic. p. 75, t. 94; Trim. Fl. Ceyl. v. 4, p. 93; Talb. Trees, Bomb. ed. 2, p. 330; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 975; Watt, Dict. Econ. Prod. v. 3, p. 353. *Ficus acutiloba*, Miq. in Hook. Lond. Journ. Bot. v. 7 (1848) p. 227; Dalz. & Gibs. p. 243.—Fruit ripe May–June.

Throughout the Presidency along the banks of streams and rivers. KONKAN: *Stocks*!, *Law*!; Malabar Hill (Bombay), *Graham, Dalzell*. DECCAN: Poona, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 1377! KANARA: N. Kanara, *Talbot*.—DISTRIB. India (throughout the hotter parts, usually near water); Ceylon, Malay Islands.

16. **Ficus asperrima,** *Roxb. Fl. Ind.* v. 3 (1832) p. 554. A shrub or small tree without aërial roots; young parts scabrous; bark white, smooth. Leaves crowded about the extremities of the branchlets, 1½–5 by ⅞–2¾ in., alternate, petiolate, oblong-lanceolate to ovate or obovate or elliptic, entire (very rarely irregularly 3-lobed) *, blunt or acuminate, serrate, toothed or crenate in the upper part, scabrid and hispid on both surfaces, base usually rounded, 3-nerved; lateral main nerves 3–5 pairs, very prominent and hispid on the lower surface as are the reticulations; petioles ⅜–1¼ in. long; stipules minute. Receptacles solitary, pedunculate, globose, ½–⅞ in. in diam., slightly depressed at the apex, when ripe yellow or purple with yellowish dots, scabrous-hispid, with rather a prominent umbilicus; basal bracts 0; peduncles ⅛–¼ in. long. MALE FLOWERS numerous in the upper part of the receptacles. Sepals 4–5, linear-lanceolate, scabrid. Stamen 1. GALL FLOWERS: Sepals as in the male. Ovary ovoid-lanceolate; style thick, terminal; stigma dilated. FERTILE FLOWERS: Sepals 6–7, linear-lanceolate, smooth. Achenes elongate, obovoid, minutely tuberculate. Style lateral, filiform; stigma obovoid. Fl. B. I. v. 5, p. 522; Grah. Cat. p. 191; Dalz. & Gibs. p. 243; Wight, Icon. t. 633; Bedd. For. Man. in Flor. Sylvat. p. ccxxiv; King, Sp. Fic. p. 80, t. 100; Trim. Fl. Ceyl. v. 4, p. 94; Talb. Trees, Bomb. ed. 2, p. 330; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Watt, Dict. Econ. Prod. v. 3, p. 343.—Fruit ripe Mar.–Apr. VERN. *Karvat.*

KONKAN: *Stocks!, Law!, Graham, Talbot*; Bombay, common, *Dalzell & Gibson*; Marmagão, *Cooke!* DECCAN: Fitzgerald Ghát below Mahableshwar, *Cooke!* S. M. COUNTRY, Rámghát, *Ritchie*, 691! KANARA: moist forests of N. Kanara, common, *Talbot.*—DISTRIB. India (Central India, W. Peninsula); Ceylon.

The leaves are used as sandpaper to polish wood and ivory.

17. **Ficus hispida,** *Linn. f. Suppl.* (1781) p. 442. A shrub or small tree, all parts more or less hispid-pubescent. Leaves usually opposite, petiolate, membranous, 4–12 by 2–6 in., ovate, oblong, or subobovate, apiculate or shortly and abruptly acuminate, toothed or entire, the lower surface hispid-pubescent, the upper hispid-scabrid, base rounded, subcordate or subcuneate, 3–5-nerved; lateral main nerves 3–5 pairs with fine reticulations between; petioles ½–1½ in. long (in young shoots 3–3½ in. long), densely hispid; stipules 2 to each leaf, ovate-lanceolate, pubescent outside, about ½ in. long. Receptacles ½–1 in. across, turbinate, obovoid or subpyriform, yellowish when ripe, slightly umbonate, hispid and sometimes with bracts scattered along the sides, on peduncles ⅕–⅗ in. long in pairs from the axils of the leaves, or in fascicles from shortened tuberculate branches from the old wood, or in pairs or fascicles on elongate stipular bracteate sometimes leafy branches issuing from the larger branches and stem and often reaching to or even penetrating the soil (*F. dœmonum*, Kœn.); basal bracts 3. MALE FLOWERS rather numerous, near the apex of the receptacle containing the galls. Sepals 3, concave, hyaline. Stamen 1; anther broad; filament short. GALL FLOWERS pedicellate. Perianth 0. Ovary smooth, globose; style short, subterminal; stigma dilated. FERTILE FLOWERS: Perianth 0 (Beddome says it is thin and transparent and

* I have collected at Marmagão a specimen (no doubt a sport) with irregularly 3-lobed leaves.

easily overlooked). Achenes ovoid; style lateral; stigma cylindric, tubular. Fl. B. I. v. 5, p. 522; Bedd. For. Man. in Flor. Sylvat. p. ccxxiv; King, Sp. Fic. p. 116, tt. 154 & 155; Trim. Fl. Ceyl. v. 4, p. 94; Talb. Trees, Bomb. ed. 2, p. 330; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 976; Watt, Dict. Econ. Prod. v. 3, p. 354. *Ficus oppositifolia*, Willd. Sp. Pl. v. 4 (1805) p. 1151; Wight, Icon. t. 638; Grah. Cat. p. 191. *Covellia oppositifolia*, Gasp. Ricer. Caprif. (1845) p. 85; Dalz. & Gibs. p. 243. *Covellia dæmonum*, Miq. in Hook. Lond. Journ. Bot. v. 7 (1848) p. 462; Dalz. & Gibs. p. 244. *Ficus dæmonum*, Kœn. in Vahl, Enum. Pl. v. 2 (1806) p. 198; Roxb. Fl. Ind. v. 3 (1832) p. 562 (*dæmona*); Grah. Cat. p. 192; Wight, Icon. t. 641.—Fruit ripe Apr.–July. VERN. *Kála-umbar*; *Bokeda*.

KONKAN: *Stocks*!, *Woodrow*; Bombay, *Graham*. DECCAN: Khandala, *Graham*. S. M. COUNTRY: Rámghát, *Ritchie*, 687!; Belgaum, *Ritchie*, 1379!. KANARA: banks of rivers and moist situations in N. Kanara, common in the moist forests near Karwar and along the coast, *Talbot*.—DISTRIB. More or less throughout India; Ceylon.

18. **Ficus glomerata,** *Roxb. Cor. Pl.* v. 2 (1798) p. 13, t. 123. An evergreen tree 50–60 ft. high; young shoots glabrous, pubescent or scaberulous. Leaves 3–6 by 1¼–2½ in., ovate-oblong or elliptic-lanceolate, tapering to a bluntish point at the apex, with entire margins, glabrous on both surfaces when mature, base acute or rounded, 3-nerved; lateral main nerves 4–6 pairs; petioles ½–1½ in. long, glabrous; stipules ¾ in. long, ovate-lanceolate, scarious, pubescent. Receptacles shortly pedunculate, on short leafless warted branches often only a few inches long which issue from the stem and larger branches, much contracted at the base when young, subglobose, pyriform or subturbinate, 1¼ in. across, smooth or pubescent, red when ripe, with depressed umbilicus (edible but usually full of worms); basal bracts 3, ovate-triangular; male, female, and gall flowers together in one receptacle, the male flowers forming a zone near the mouth, the fertile female flowers forming a layer near the walls of the receptacle, and the gall flowers a more internal layer. MALE FLOWERS sessile. Sepals 3–4, membranous, inflated, enveloping the 2 elongate ovate anthers; filaments connate. GALL FLOWERS pedicellate. Perianth gamophyllous, irregularly toothed, covering only the base of the rough ovoid ovary. Style lateral, elongate; stigma clavate. FERTILE FLOWERS subsessile. Perianth gamophyllous, with 4 or 5 long lanceolate teeth enveloping the small minutely tuberculate achene. Style subterminal; stigma clavate. Fl. B. I. v. 5, p. 535; Grah. Cat. p. 190; Wight, Icon. t. 667; Bedd. For. Man. in Flor. Sylvat. p. ccxxiv; King, Sp. Fic. p. 173, t. 218 A; Trim. Fl. Ceyl. v. 4, p. 96; Talb. Trees, Bomb. ed. 2, p. 331; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 978; Watt, Dict. Econ. Prod. v. 3, p. 351. *Covellia glomerata*, Miq. in Hook. Lond. Journ. Bot. v. 7 (1848) p. 465; Dalz. & Gibs. p. 243.—Fruit ripe at different times of the year. VERN. *Umbar*.

Common throughout the Presidency near villages, along roadsides and near streams and rivers.—DISTRIB. Throughout India; Ceylon.

Ficus scandens, Roxb. Hort. Beng. (1814) p. 65. A large rooting climber, a native of the Subhimalayas, Behar, Khasia Hills, and Birma, occasionally cultivated in gardens. Fl. B. I. v. 5, p. 526; King, Sp.

Fic. p. 129, t. 162; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 977.

Ficus elastica, Roxb. Hort. Beng. (1814) p. 65. A large glabrous usually epiphytic tree, with aërial roots and large coriaceous, shining, closely parallel-nerved leaves 5–10 in. long, with pink stipules reaching sometimes 6 in. long. The receptacles are enclosed while young by hooded involucres which fall off, leaving a saucer-shaped basal cup under the receptacle. The *Indian Caoutchouc Tree*, a native of the outer Himalaya, Assam, Khasia Hills, Birma, and the Malayan Archipelago, sometimes grown as an ornamental tree in gardens in Bombay and Poona. Fl. B. I. v. 5, p. 508; Grah. Cat. p. 190; Dalz. & Gibs. Suppl. p. 79; King, Sp. Fic. p. 45, t. 54; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515, & Gard. in Ind. ed. 5, p. 454; Watt, Dict. Econ. Prod. v. 3, p. 350.

Ficus carica, Linn. Sp. Pl. (1753) p. 1059. A middle-sized deciduous tree said to be indigenous in Syria and Palestine, with cordate 3–5-nerved dentate and more or less deeply lobed leaves 4–8 in. long, grown for its edible fruit. It is not very extensively grown in the Bombay Presidency, the area under its cultivation being about 300 acres, most of which are in the Poona Collectorate. It is grown in N.W. India, largely cultivated in Afghanistan and Beluchistan as well as in S. Europe. Grah. Cat. p. 191; Dalz. & Gibs. Suppl. p. 80; Brandis, For. Fl. p. 418; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515, & Gard. in Ind. ed. 5, p. 451; Watt, Dict. Econ. Prod. v. 3, p. 347. *The Fig.*—VERN. *Anjir.*

EXCLUDED SPECIES OF *FICUS*.

FICUS BENJAMINA, Linn. Mantiss. (1767) p. 129; Fl. B. I. v. 5, p. 508; King, Sp. Fic. p. 43, t. 52 & t. 83, fig. H; Watt, Dict. Econ. Prod. v. 3, p. 346. *Urostigma Benjamineum*, Miq. in Hook. Lond. Journ. Bot. v. 6 (1847) p. 583; Dalz. & Gibs. p. 242. ? *Ficus striata*, Roth, Nov. Pl. Sp. (1821) p. 387.

The only apparent authority for the existence of this tree in the Bombay Presidency is the statement in Dalzell & Gibson's 'Bombay Flora' (*l. c.*) that Roth's specimens of *Ficus striata*, which Sir G. King considers doubtfully synonymous with *F. Benjamina*, were received from the S. Maratha Country, but I can find no evidence that this was so. Sir George King has never seen a wild specimen from W. India, nor has the tree been found wild in the Bombay Presidency either by Talbot or Woodrow.

17. **ANTIARIS,** Leschen.

Evergreen trees. Leaves alternate, bifarious, penninerved, entire or serrate; stipules small, connate, caducous. Flowers monœcious, the males crowded on the surface of an axillary pedunculate receptacle surrounded by confluent imbricating bracts, the females minute, solitary, in a pyriform involucre of many confluent bracts. MALE FLOWERS: Sepals 3–4, narrowly spathulate, imbricate. Stameus 3–8. Pistillode 0. FEMALE FLOWERS: Perianth 0. Ovary adnate to the involucre; ovule pendulous; style-arms 2, subulate, recurved. Fruit fleshy; pericarp confluent with the receptacle. Seed exalbuminous; testa hard; embryo subglobose; cotyledons equal, fleshy; radicle small, superior.—DISTRIB. Species 5 or 6, Indian, Malayan, and Australian.

1. **Antiaris toxicaria,** *Leschen. in Ann. Mus. Par.* v. 16 (1810) p. 478. A very tall tree reaching 250 ft. in height; trunk often buttressed; bark dark-grey, pustular. Leaves 3–6 by $1\frac{1}{4}$–$2\frac{1}{2}$ in., elliptic-

oblong, acuminate, often polished and shining above, subcordate or truncate; main between, the midrib velvety; monœcious, the male receptacles 3–4 together, orbicular, tomentose, ½ in. in diam., peduncles velvety; the females solitary, enclosed in a pear-shaped axillary subsessile velvety involucre of numerous confluent bracts. MALE FLOWERS: Sepals 3–4, spathulate, imbricate. Stamens 3–8; filaments erect. FEMALE FLOWERS: Perianth 0. Ovary adnate to the involucre. Fruit red, velvety, ¾ by ½ in.; pyriform or subglobose, 1-seeded, on a stalk ⅜ in. long. Fl. B. I. v. 5, p. 537; Trim. Fl. Ceyl. v. 4, p. 97; Talb. Trees, Bomb. ed. 2, p. 332; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Watt, Dict. Econ. Prod. v. 1, p. 266. *Antiaris innoxia*, Blume, Rumphia, v. 1 (1835) p. 172, t. 54; Bedd. Flor. Sylvat. t. 307. *A. saccidora*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 232; Dalz. & Gibs. p. 244. *Lepurandra saccidora*, Nimmo, in Grah. Cat. p. 193.—Flowers: Sept.–Oct. VERN. *Karwat*; *Jasund*. Known also as *The Upas Tree* and the *Travancore Sacking Tree*.

mucronate, glabrous, entire or serrulate, base usually rounded but sometimes sub-nerves 8–10 pairs with reticulate venation petioles ¼ in. long, stout, velvety. Flowers

KONKAN: on the hills, *Dalzell & Gibson*: evergreen forests, *Talbot*; Wari country, *Dalzell & Gibson*. DECCAN: Khandala, *Graham*, *Dalzell & Gibson*. KANARA: in evergreen forests, common at Yellapur, *Talbot*.—DISTRIB. India (Birma, Pegu, Tenasserim, W. Peninsula); Ceylon, Malay Peninsula and Archipelago.

The tough inner bark readily separates from the wood and is formed into sacks by the hill tribes. The trunk or branch is cut to the required length and then soaked in water and beaten till the fibre separates from the wood. The fibre is then turned inside out and a slice of wood cut off to form the bottom of the sack. I have seen a coat and a pair of trousers made of the fibre, but as a curiosity, not for wear.

18. **ARTOCARPUS,** Forst.

Evergreen trees with milky juice. Leaves alternate, coriaceous, often very large, entire, lobed or pinnatifid, penninerved. Flowers monœcious, densely crowded on globose or oblong 1-sexual solitary usually axillary receptacles, often mixed with scales which are often thickened or peltate at the apex. MALE FLOWERS: Perianth 2–4-lobed or -partite; lobes obtuse, valvate or slightly imbricate. Stamen 1, erect. Pistillode 0. FEMALE FLOWERS: Perianths tubular, confluent below with the receptacle; mouth minute. Ovary straight; ovule pendulous; style central or lateral; stigma entire (rarely 2–3-fid). Fruit a much enlarged fleshy oblong cylindric or subglobose entire or lobed receptacle, clothed with the greatly accrescent fleshy perianths and carpels (*anthocarps*) which have hardened spinescent or truncate or pyramidal or flat apices. Seed pendulous; testa membranous; albumen 0; embryo straight or incurved; cotyledons fleshy, equal or unequal; radicle short, superior.—DISTRIB. Tropical Asia, Malaya, China, Pacific Islands; species about 40.

Fruit spinous (the tips of the anthocarps ending in a sharp spine) . 1. *A. hirsuta*.
Fruit smooth (tips of the anthocarps truncate and flat) ..... 2. *A. Lakoocha*.

1. **Artocarpus hirsuta,** *Lam. Encycl. Méthod.* v. 3 (1789) p. 210. A large evergreen tree attaining 200 ft. in height (*Brandis*); young shoots, petioles, peduncles, stipules, midribs, and main nerves appressedly hispid with long tawny hairs. Leaves 6–9 by 4–6 in., broadly ovate or elliptic (rarely obovate), subacute, coriaceous, entire, smooth, and when adult glabrous except on the midrib and nerves beneath, slightly narrowed

to the base; main nerves about 10 pairs, prominent beneath; petioles stout, ½–⅞ in. long; stipules nearly 1 in. long, lanceolate. Flowers on axillary pedunculate receptacles; the male receptacles narrowly cylindric, at first erect or ascending, afterwards pendulous, 4–6 in. long and about ¼ in. in diam.; the female receptacles erect, 4½ by 3½ in. MALE FLOWERS: Sepals 2, united below. Stamen 1; anther exserted, ovate. Receptacle-scales (bracteoles) chaffy, not peltate. FEMALE FLOWERS: Perianth tubular, confluent below with the receptacle. Fruit size of a lemon, echinate, the spines (free apices of anthocarps) about ¼ in. long, cylindric, straight, hispid, perforate at the apex for the filiform style, edible. Seeds ½–¾ in. long, ovoid. Fl. B. I. v. 5, p. 541; Grah. Cat. p. 193; Dalz. & Gibs. p. 244; Bedd. Flor. Sylvat. t. 308; King, in Ann. Roy. Bot. Gard. Calc. v. 2 (1889) p. 9, t. 5; Talb. Trees, Bomb. ed. 2, p. 332; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Watt, Dict. Econ. Prod. v. 1, p. 329.—Flowers: Jan.–Feb.

KONKAN: *Law!*, *Talbot*. DECCAN: Bhor country, *Dalzell & Gibson*; Sangli, *Dalzell!* KANARA: evergreen forests of N. Kanara, *Talbot*; Divimana (N. Kanara), *Woodrow*.—DISTRIB. India (W. Peninsula).

2. **Artocarpus Lakoocha,** *Roxb. Fl. Ind.* v. 3 (1832) p. 524. A large deciduous tree reaching 50–60 ft. in height with a spreading head; bark rough, grey; young shoots thin, densely clothed with a soft grey, tawny or rusty tomentum. Leaves coriaceous, 4–12 by 2–6 in., oblong, elliptic or subovate, entire (the young ones sometimes serrate), obtuse, cuspidate, glabrous and shining above, softly pubescent beneath, base broad or narrow, truncate or rounded; main nerves 6–12 pairs with reticulate venation between; petioles ½–1 in. long, lanceolate, tawny-pubescent. Flowers in axillary globose shortly pedunculate heads; bracteoles peltate. MALE FLOWERS: Sepals 2–3, triangular, truncate, puberulous. Stamen 1; filament broad below, tapering upwards; anther exserted, short, broad, 2-celled. FEMALE FLOWERS: Anthocarps completely united. Fruit 2–3 in. in diam., lobulate, smooth, velvety, yellow, edible. Seeds oblong, few, broad, about ½ in. across. Fl. B. I. v. 5, p. 543; Grah. Cat. p. 193; Dalz. & Gibs. p. 244; Bedd. For. Man. in Flor. Sylvat. p. ccxix; King, in Ann. Roy. Bot. Gard. Calc. v. 2 (1889) p. 14; Talb. Trees, Bomb. ed. 2, p. 332; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 971; Watt, Dict. Econ. Prod. v. 1, p. 333.—Flowers: Mar.–Apr. VERN. *Otamb*; *Lowi*.

KONKAN: *Law!*, *Stocks!*, *Talbot*; Salsette and N. Konkan, *Graham*. S. M. COUNTRY: Dharwar, *Woodrow*. KANARA: evergreen forests of N. Kanara, common in the forests of Yellapur, *Talbot*; Yacombi, *Woodrow!*, *Cooke!*; west of Supa, *Ritchie*, 1381!—DISTRIB. India (Subhimalayan tract and outer hills, Khasia, Birma, W. Peninsula); Ceylon, Malay Peninsula.

Artocarpus integrifolia, Linn. f. Suppl. (1781) p. 412. A large evergreen tree, glabrous except the youngest shoots. Leaves 4–8 in. long, elliptic or obovate, acuminate, entire, or those of the young plants sometimes lobed, dark-green and shining above, rather rough beneath, base narrowed; main nerves 7–8 pairs; petioles ½–1 in. long; stipules large, glabrous, soon caducous. Fruit 12–30 by 6–12 in., hanging on short stalks from the trunk and larger branches; anthocarps pyramidal. Seeds oblong or reniform, oily, of the size of a nutmeg. Fl. B. I. v. 5, p. 541; Grah. Cat. p. 192; Dalz. & Gibs. p. 244; Bedd. For. Man. in Flor.

Sylvat. p. ccxix; Talb. Trees, Bomb. ed. 2, p. 331; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 971; Watt, Dict. Econ. Prod. v. 1, p. 330.—Flowers: Nov.-Jan. VERN. *Phannas.*

The well-known *Jack-fruit Tree*, widely cultivated, said by Beddome and Gamble to be indigenous in some of the forests of the Western Ghâts. In the Bombay Presidency it is, so far as I know, found only in the neighbourhood of villages or near the sites of deserted villages. The yellow pulp of the large fruit is much eaten, as are the seeds which are cooked. The wood was formerly used extensively in the manufacture of furniture; it is bright yellow when freshly cut, but darkens by age, becoming like mahogany.

Artocarpus incisa, Linn. f. Suppl. (1781) p. 411. A midle-sized tree with leaves 1–2 feet long, more or less deeply pinnatifidly cut in the upper part, and a muricated fruit of the size of a small pummalo. Fl. B. I. v. 5, p. 539; Grah. Cat. p. 192; Dalz. & Gibs. Suppl. p. 79 (by error *A. indica*); Talb. Trees, Bomb. ed. 2, p. 331; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516, & Gard. in Ind. ed. 5, p. 456; Bot. Mag. t. 2869–2871.

The *Bread-fruit Tree*, a native of the Pacific Islands. The equable humid climate of Bombay seems to suit it, and plants have been grown at the Victoria Gardens and at Parel, Girgaum, and Colaba. It does not thrive if planted at any distance from the sea.

The following plants not belonging to any of the foregoing genera are variously grown or found as weeds in the Presidency:—

Morus alba, Linn. Sp. Pl. (1753) p. 986. A deciduous monœcious tree 30–40 ft. high, cultivated in gardens. Its native country is not known with certainty. The tree is known as *The White Mulberry*, though the color of the fruit varies from white to purple. It is cultivated for its fruit and for its leaves, which latter are used to feed silkworms. Fl. B. I. v. 5, p. 492; Grah. Cat. p. 194; Dalz. & Gibs. Suppl. p. 80; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Watt, Dict. Econ. Prod. v. 5, p. 279.—VERN. *Tut.*

Morus indica, Linn. Sp. Pl. (1753) p. 986. A deciduous shrub or small tree wild in the Subhimalayan tract, the outer hills of the Panjáb, and the valley of Sikkim, cultivated largely in Bengal and Birma and sparingly in the W. Peninsula for its leaves, which are used to feed silkworms. Much money was spent by the Bombay Government in an attempt to introduce the cultivation of this plant into the Deccan, which after 12 years' trial resulted in failure and was abandoned in 1846 (Dalzell & Gibson, Suppl. p. 80). The shrub is common about villages in N. Kanara (*Talbot*). Fl. B. I. v. 5, p. 492; Grah. Cat. p. 194; Dalz. & Gibs. Suppl. p. 80; Talb. Trees, Bomb. ed. 2, p. 324; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Prain, Beng. Pl. p. 967; Watt, Dict. Econ. Prod. v. 5, p. 281.—Flowers: Feb.-June.

Morus lævigata, Wall. Cat. 4649. A middle-sized deciduous tree, a native of the tropical and subtropical Himalayas, with ovate shortly acuminate often cordate leaves and long cylindric yellowish-white sweet but insipid fruit, cultivated in gardens at Dharwar (fide *Talbot*). Fl. B. I. v. 5, p. 492; Talb. Trees, Bomb. ed. 2, p. 324; Prain, Beng. Pl. p. 968; Watt, Dict. Econ. Prod. v. 5, p. 284.—Flowers: Nov.-Feb.

Pilea microphylla, Liebm. in Vidensk. Selsk. Skr. ser. 5, v. 2 (1851) p. 296. A small usually creeping herb a native of S. America, rapidly becoming naturalized in India, known as *The Gunpowder Plant*, owing to the cloud of pollen discharged from the anthers when the plant is shaken, occurs as a weed in Bombay and Poona. Prain, Beng. Pl. p. 962. *Pilea muscosa*, Lindl. Coll. Bot. (1821) t. 4; Fl. B. I. v. 5, p. 551; Trim. Fl. Ceyl. v. 4, p. 108; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516. *Parietaria microphylla*, Linn. Syst. ed. 10 (1759) p. 1308.—Flowers: Oct.

Cannabis sativa, Linn. Sp. Pl. (1753) p. 1027. A tall erect annual herb, wild in Central Asia, cultivated in many parts of the Presidency for the intoxicating drugs known as *Gánja*, *Charas*, and *Bhán*g which are obtained from it. The cultivation in India for the fibre the plant produces does not seem to have been attended with satisfactory results. A very full description may be found in Watt's Dict. Econ. Prod. v. 2, pp. 103–126. Fl. B. I. v. 5, p. 487; Grah. Cat. p. 187; Dalz. & Gibs. Suppl. p. 79; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 515; Watt, Dict. Econ. Prod. v. 2, p. 103. *Cannabis indica*, Lamk. Encyc. Méthod. v. 1 (1783) p. 695.

Conocephalus suaveolens, Blume, Bijdr. (1825) p. 484. A scandent diœcious shrub common in the forests of Chittagong, Silhet, and Eastern Bengal, with alternate elliptic-oblong entire smooth leaves 4–8 by 3–6 in., and corymbose axillary heads of very fragrant flowers, is grown in gardens. Fl. B. I. v. 5, p. 545; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Prain, Beng. Pl. p. 969. *Urtica naucliflora*, Roxb. Fl. Ind. v. 3 (1832) p. 592.

Pellionia Daveauana, N. E. Brown, in Gard. Chron. (1880) part 2, p. 262. A creeping succulent herb, a native of Cochinchina, suitable for a suspended basket or rock-work. Its leaves are very ornamental, ½–2¼ in. long, roundish-elliptic or elliptic-oblong, either entirely of a dark bronzy olive-green slightly tinted with violet, or marked with a broad central irregular band of bright green. Woodr. Gard. in Ind. ed. 5, p. 455.

Pellionia pulchra, N. E. Brown, in Gard. Chron. (1882) part 2, p. 712. A creeping succulent herb with leaves which are blackish along the midrib and veins, the interspaces being green, affording a pretty variegation. Suitable for hanging baskets and rock-work. Woodr. Gard. in Ind. ed. 5, p. 456.

Laportea Schomburghii, versicolor, Bull. Cat. (1875) p. 7. A handsome ornamental-leaved plant, a native of the South Sea Islands, introduced into London in 1875. Leaves deep green, irregularly mottled with greyish-green, and variegated with patches of creamy white; petioles fleshy, red-purple, which color is continued along the midrib and nerves. Nicholson, Dict. Gard. v. 2, p. 235; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516.

Excluded Species.

LAPORTEA CRENULATA, Gaud. in Freyc. Voy. Bot. p. 498. A large evergreen shrub 8–10 ft. high with highly irritant stinging hairs and ovate or elliptic entire or

crenulate leaves, known as the *Fever-* or *Devil-nettle*. A sting from the hairs is very painful, the effects lasting for several days.

There is one sheet in Herb. Kew. marked "*Konkan Herb. Stocks*," not, however, in Stocks's handwriting. It is not an uncommon experience to find it assumed that anything collected by Stocks to which no locality has been assigned was collected in the Konkan. In the present case there is not a shadow of evidence to show that the plant was collected in that division of the Presidency. Talbot says (Trees, Bomb. ed. 2, p. 333): "Does not seem to have been met with in the Presidency by any other collector since Stocks's time." It is quite inconceivable that a plant possessing such formidable stinging properties (for a full description of which a reference may be made to Beddome's *Flora Sylvatica*, t. 306) should have escaped notice if it existed in the Presidency. Fl. B. I. v. 5, p. 550; Brandis, For. Fl. p. 404; Bedd. Flor. Sylvat. t. 306; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 516; Watt, Dict. Econ. Prod. v. 4, p. 587.

VILLEBRUNEA INTEGRIFOLIA, Gaud. Voy. Bonite (1844–46) t. 91. A small evergreen tree with elliptic-oblong membranous leaves 6–14 in. long, drying brown, and globose flower-clusters in small dichotomously branched hispid cymes from the branchlets below the leaves. Fl. B. I. v. 5, p. 589; Talb. Trees, Bomb. ed. 2, p. 334; Prain, Beng. Pl. p. 966; Watt, Dict. Econ. Prod. v. 6, part 4, p. 238.

There are 2 sheets in Herb. Kew. marked "*Herb. Stocks Konkan*," but not in Stocks's handwriting. This seems to be a case similar to that of *Laportea crenulata*, in which a plant collected by Stocks, without an authentic locality-label on it, was assumed to have been collected in the Konkan. No other collectors have found the plant there, and Talbot, who has an intimate acquaintance with the plants of the South Konkan and North Kanara, remarks (*l. c.*): "This species has not been met with in the Bombay Presidency as far as I know."

CONOCEPHALUS CONCOLOR, Dalz. in Dalz. & Gibs. Bo. Fl. (1861) p. 239. Shrubby. Leaves very large, 1 ft. long, irregularly scattered, 3-nerved, perfectly smooth, oblong-ovate, acute, green on both sides. Female flower axillary. DECCAN: Phonda Ghat, *Dalzell & Gibson*. The above is Dalzell's description of the plant, which has not as yet been found by any other collector, and there are no specimens anywhere so far as I know. Fl. B. I. v. 5, p. 546; Talb. Trees, Bomb. ed. 2, p. 333.

ORDER CXVII. CASUARINACEÆ.

An Order with only one genus (*Casuarina*), of which one species (*Casuarina equisetifolia*, Forst. Char. Gen. [1776] p. 104, t. 52) is extensively planted but is not indigenous in the Bombay Presidency. It is a tall evergreen leafless very ornamental dicœcious tree, with cylindric or angled deciduous branchlets. There are large plantations in N. Kanara near the sea-coast, and, from the readiness with which it accommodates itself to coast-sands, the tree is useful in the reclamation of land from the sea (*Gamble*). The reddish-brown wood, known as the *Beef-wood* of Australia, is very heavy and hard and almost unworkable by Indian carpenters owing to its hardness. It is chiefly used for fuel. The wind, when blowing through a plantation of *Casuarinas*, sounds like the waves of the sea. Fl. B. I. v. 5, p. 598; Dalz. & Gibs. Suppl. p. 82; Bedd. For. Man. in Flor. Sylvat. p. ccxxvi; Trim. Fl. Ceyl. v. 4, p. 120; Talb. Trees, Bomb. ed. 2, p. 335; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Prain, Beng. Pl. p. 985; Watt, Dict. Econ. Prod. v. 2, p. 230. *Casuarina muricata*, Roxb. Fl. Ind. v. 3, p. 519; Grah. Cat. p. 196; Dalz. & Gibs. Suppl. p. 82.—DISTRIB. India (east side of the Bay of Bengal from Chittagong southwards, elsewhere planted); Malay Archipelago, Australia.

Order CXVIII. SALICACEÆ.

Deciduous fast-growing trees or shrubs. Leaves alternate, petiolate; stipules free. Flowers dicœcious (rarely monœcious), in catkins which are similar in both sexes, each bract bearing 1 flower in its axil; bracteoles 0. Perianth 0. Disk of one or more scales or glands, or cup-shaped. Male flowers: Stamens 2 or more; filaments free or connate; anthers ovate-oblong, dehiscing longitudinally. Rudimentary ovary in normal flowers 0. Female flowers: Ovary sessile or stalked, 1-celled; ovules few or many, on 2–4 sub-basal or parietal placentas, erect, anatropous; style short or 0; stigmas short, notched or lobed. Fruit an ovoid or lanceolate 2–4-valved capsule. Seeds few or many; funicle with a pencil of long silky deciduous hairs; albumen 0; cotyledons plano-convex; radicle short, inferior.—Distrib. Genera 2; species about 180, chiefly in N. temperate regions.

Petioles short; disk of 1 or 2 separate glands; stamens 2–12; ovules few on each placenta	1. Salix.
Petioles long; disk flat or cup-shaped; stamens 4–30; ovules numerous on each placenta	2. Populus.

1. SALIX, Linn.

Trees or shrubs. Leaves lanceolate, ovate or elliptic, entire or serrulate; petioles short, as a rule less than $\frac{1}{4}$ the length of the leaf-blade; stipules various. Flowers small, dicœcious (rarely monœcious; sometimes androgynous in *S. ichnostachya*), in usually dense catkins; bracts small, entire. Perianth 0. Disk of 2 scales (anterior and posterior) or of one posterior scale, fleshy or glandular. Male flowers: Stamens 2–12 (in many species 2); filaments long, filiform, usually free; anthers usually small. Female flowers: Ovary sessile or stalked; placentas 2; ovules 2-seriate on each placenta, usually 4–8; style usually short with 2 short retuse or 2-fid arms. Fruit a 2-valved capsule, the valves generally rolled back. Seeds with a penicillate funicle; albumen 0; cotyledons plano-convex; radicle inferior.—Distrib. Species about 160, almost all in the Northern Hemisphere.

Capsules glabrous, pedicellate	1. *S. tetrasperma*.
Capsules densely woolly, sessile or nearly so	2. *S. ichnostachya*.

1. **Salix tetrasperma,** *Roxb. Cor. Pl.* v. 1 (1795) p. 66, t. 97. A much-branched tree 20–40 ft. high; bark rough with deep vertical furrows; young shoots silky, becoming glabrous. Leaves 2–5 by $\frac{5}{8}$–$1\frac{1}{2}$ in., lanceolate, acute or acuminate, usually serrulate, sometimes obscurely so, green and glabrous above, white and more or less silky beneath when very young; petioles $\frac{3}{8}$–$\frac{5}{8}$ in. long; stipules subulate, deciduous. Flowers appearing after the leaves; catkins hairy, 2–5 in. long; peduncles silky-villous, leafy at the base. Male flowers sweet-scented, sessile; bracts ovate, concave, subacute, silky-villous, veined. Disk of 2 yellow glands. Stamens 5–10; filaments free, of various lengths, the longest about twice as long as the bract; anthers yellow. Female flowers pedicellate; bracts smaller than those of the male, oblong or obovate-oblong, hairy. Disk small, $\frac{1}{2}$-annular, yellow, clasping the pedicel at the side opposite the bract. Ovary fusiform, glabrous;

ovules 4–6 (usually 4); stigma sessile, 2-branched, each branch 2-lobed. Capsule glabrous, $\frac{1}{8}$–$\frac{1}{6}$ in. long on a long slender stalk. Seeds 4–6. Fl. B. I. v. 5, p. 626; Grah. Cat. p. 195; Dalz. & Gibs. p. 220; Wight, Icon. t. 1954; Bedd. Flor. Sylvat. t. 302; Talb. Trees, Bomb. ed. 2, p. 336; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Prain, Beng. Pl. p. 989; Watt, Dict. Econ. Prod. v. 6, part 2, p. 391.—Flowers: Oct. VERN. *Walunj*.

DECCAN: Poona, *Woodrow*; Mahableshwar, *Cooke*!, *H. M. Birdwood*, vale of the Yena (Mahableshwar) and other moist places, *Graham*. S. M. COUNTRY: in various places, *Law* ex *Graham*; Belgaum, *Ritchie*, 159!; planted along roadsides about Belgaum, chiefly male trees, *Talbot*.—DISTRIB. India (on river-banks and in moist places); China, Malay Peninsula and Archipelago.

2. **Salix ichnostachya,** *Lindl. in Wall. Cat.* (1828) n. 3702. A moderate-sized tree. Leaves 3–6 by $\frac{7}{8}$–2 in., lanceolate or elliptic-lanceolate, acute or acuminate, subcoriaceous, smooth and shining above, glaucous beneath, penninerved, base usually acute; main nerves numerous, slender; petioles $\frac{1}{2}$–$1\frac{1}{4}$ in. long. Catkins softly woolly, often androgynous (the males and females mixed in the same catkin). MALE FLOWERS: Bracts $\frac{1}{8}$ in. long, ovate-oblong, obtuse, concave, densely woolly. Stamens 6–8. FEMALE FLOWERS: Bracts much smaller than in the male, $\frac{1}{16}$–$\frac{1}{12}$ in. long, suborbicular, concave, densely woolly. Ovary sessile or nearly so; stigma sessile, short, 2-fid. Capsules sessile or nearly so, globosely ovoid, densely woolly. Fl. B. I. v. 5, p. 628; Wight, Icon. t. 1953; Talb. Trees, Bomb. ed. 2, p. 336.—Flowers: Oct.

In the specimens from Wight's Herbarium in Herb. Kew. many of the catkins are androgynous.

KONKAN and N. KANARA: along river-banks, *Talbot*.—DISTRIB. India (W. Peninsula).

Salix babylonica, Linn. Sp. Pl. (1753) p. 1017. A tree attaining 50 ft. high with drooping branches. Leaves 3–6 by $\frac{1}{2}$ in., narrowly lanceolate. Flowers appearing with the leaves; catkins very slender, the male catkins $\frac{1}{2}$–1 in. long, the female 1 in. long. Capsules glabrous, sessile. *The Weeping Willow,* well known in England, occasionally grown as an ornamental tree.—Graham says that there was a plant in Parel Garden, Bombay, reared from a cutting of the tree which grew over the tomb of Napoleon at St. Helena. Fl. B. I. v. 5, p. 629; Grah. Cat. p. 195; Dalz. & Gibs. Suppl. p. 81; Watt, Dict. Econ. Prod. v. 6, part 2, p. 388.

2. **POPULUS,** Linn.

Trees with scaly often resinous buds. Leaves alternate, usually broad, 3–5-nerved from the base, penninerved above, entire, toothed or lobed (in the only Bombay species very heteromorphous); stipules narrow, membranous, fugacious. Flowers often pedicellate in both sexes, dioecious, in usually lax catkins; bracts of catkins caducous, crenate or lobed. Disk fleshy or membranous, cup-shaped, often oblique, entire, toothed or irregularly lobed. MALE FLOWERS: Stamens 4–30; filaments filiform, free; anthers usually large. FEMALE FLOWERS: Ovary sessile within the disk; placentas 2–3 (rarely 4); ovules many on each placenta. Capsule 2–4-valved. Seeds very small with a long and dense coma.—DISTRIB. Species 18, chiefly in N. temperate regions.

1. **Populus euphratica,** *Oliv. Voy. Atlas,* v. 3, p. 449, tt. 45, 46. A middle-sized usually gregarious tree 40–50 ft. high; buds slightly pubescent, not viscid. Leaves most variable in shape, those of seedlings, young trees, and young shoots linear or oblong, entire and shortly petiolate, 3–6 in. long, those of older trees usually broadly ovate, rhomboid or orbicular, 2–3 in. long and often as broad or broader than long, dentate or more or less cut or lobed, with a rounded cordate or cuneate 3–5-nerved base, the narrower leaves sometimes entire. Flowers pedicellate in both sexes; catkins glabrous. MALE FLOWERS on long slender pedicels reaching $\frac{1}{3}$ in. long. Disk membranous, suborbicular, with 6–8 (usually 8) irregular acute teeth. Stamens 8–12; filaments filiform; anthers oblong, quadrangular, longer than the filaments. FEMALE FLOWERS: Disk membranous, caducous, tubular, with 8–12 linear segments. Stigmas 2–3, more or less irregularly crescent-shaped, narrowed into a short style. Capsules $\frac{1}{4}$–$\frac{1}{2}$ in. long, ovoid-lanceolate, turgid, 2–3- (commonly 3-) valved; pedicels shorter than the capsules. Seeds narrowly ellipsoid, acute at both ends, $\frac{1}{25}$ in. long, enveloped in a mass of silky hairs. Fl. B. I. v. 5, p. 638; Talb. Trees, Bomb. ed. 2, p. 336; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Watt, Dict. Econ. Prod. v. 6, part 1, p. 326.—Flowers: Feb., nearly leafless in January. VERN. *Bán.*

In the Bombay Presidency confined to Sind. SIND: *Ritchie,* 690!, *Stocks,* 424!, *Dalzell*!, *Woodrow.*—DISTRIB. India (Panjáb); W. Thibet, Beluchistan, Afghanistan, westwards to Syria and Egypt.

The wood is largely used for fuel in Sind.

ORDER CXIX. CERATOPHYLLACEÆ.

Submerged slender fragile branched herbs. Leaves whorled, dichotomously cleft into filiform minutely toothed lobes; stipules 0. Flowers minute, monœcious, axillary, sessile. MALE FLOWERS solitary. Perianth (or involucre) of 6–12 narrow subvalvate 2-fid segments. Stamens 20–30; filaments very short; anthers erect, extrorse, dehiscing longitudinally; connective truncate or 2-toothed at the apex. FEMALE FLOWERS: Perianth of the male. Ovary sessile, ovoid, 1-celled; ovule solitary, pendulous, orthotropous; style subulate, stigmatic on one side. Fruit a small coriaceous ovoid or ellipsoid somewhat compressed nutlet, terminating in a long subulate style with a spur projecting from the base on either side. Seed pendulous; testa membranous; albumen 0; embyro straight; cotyledons thick; radicle short, inferior; plumule many-leaved.—DISTRIB. Genus 1; species 1, very variable, in all temperate and tropical countries.

1. CERATOPHYLLUM, Linn.

Characters of the Order.

1. **Ceratophyllum demersum,** *Linn. Sp. Pl.* (1753) p. 992. Whole plant 8–36 in. long, forming a much-branched tangle of slender branches and leaves which collapse in a tassel when taken out of the water. Leaves about 1 in. long; segments spreading in water, variable in thickness and amount of toothing. MALE FLOWERS solitary, in separate axils from the female but on the same plant. Perianth (or involucre) of 6–12 narrow 2-fid segments. Stamens 10–30, sessile;

anthers large, white (*Clarke*). FEMALE FLOWERS: Perianth (or involucre) as in the male, often with an entire acute (not 2-fid) apex. Ovary sessile, 1-celled; style subulate. Fruit very variable. Fl. B. I. v. 5, p. 639; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Engler, in Engl. & Prantl, Pflanzenf. v. 3, part 2, p. 11, fig. 12; Prain, Beng. Pl. p. 990. *Ceratophyllum verticillatum*, Roxb. Hort. Beng. (1814) p. 68, & Fl. Ind. v. 3 (1832) p. 624; Trim. Fl. Ceyl. v. 4, p. 120.

Sir Joseph Hooker (Fl. B. I. l. c.) considers the Indian species of Chamisso and Wallich to be referable to this, but at the same time is of opinion that an examination of living specimens is necessary for verification. Wight and Arnott (Prodr. pp. 309 & 310) give 3 Indian species figured in Wight's 'Icones,' but suggest that these might perhaps be regarded as forms of *C. verticillatum*, Roxb., which Sir J. Hooker makes synonymous with *C. demersum*. The following are the 3 species given by Wight and Arnott:—

C. tuberculatum, Cham. in Linnæa, v. 4 (1829) p. 504, t. 5, fig. 6 *d*. Fruit ellipsoid, slightly compressed, wingless; spines at first slender and weak, afterwards strong; sides of the fruit convex, finely tuberculate. Wight & Arn. Prodr. p. 309; Wight, Icon. t. 1948, fig. 3.

C. muricatum, Cham. in Linnæa, v. 4 (1829) p. 504, t. 5, fig. 6 *c*. Fruit ellipsoid, slightly compressed, winged; spines slender, weak; wing narrow, regularly many-toothed; sides of the fruit convex, more or less muricated, particularly towards the apex. Wight & Arn. Prodr. p. 309; Wight, Icon. t. 1948, figs. 1, 2. *C. platyacanthum*, Cham. l. c. fig. 6 *a*; Engl. in Engl. & Prantl, Pflanzenf. v. 3, part 2, p. 12.

C. missionis, Wall. Cat. (1828) n. 7007. Fruit ellipsoid, slightly compressed, winged; spines elongate, the lateral ones flattened; the wing broader downwards and decurrent along the base of the spines, with a few irregular teeth; sides of the fruit convex, finely tuberculate. Wight & Arn. Prodr. p. 310; Wight, Icon. t. 1948, fig. 4.

ORDER CXX. GNETACEÆ.

Trees or shrubs; branches jointed at the nodes. Leaves opposite, large and green or minute and scale-like; stipules 0. Flowers 1-sexual, monœcious or dicœcious, in axillary or terminal spikes or cones. MALE FLOWERS: Perianth valvately 2-lobed or spathaceous. Stamens connate in a column of united filaments; anthers 2–8, globose, 1–3-celled, sessile or subsessile on the column. FEMALE FLOWERS: a naked erect ovule with 2–3 coats, of which one is produced into a styliform tube with a discoid mouth. Seed dry or drupe-like; albumen copious or scanty; embryo straight; cotyledons appressed; radicle long, superior.—DISTRIB. Genera 3; species about 40, in temperate and tropical regions.

Shrubs leafless or nearly so ..... 1. EPHEDRA.
Trees or shrubs with large green leaves ..... 2. GNETUM.

1. EPHEDRA, Linn.

Erect or subscandent rigid shrubs; branches opposite or whorled, terete, striate, with membranous sheaths at the nodes, which often bear narrow leafy blades. Flowers unisexual, usually dicœcious. MALE FLOWERS in short bracteate spikelets which are whorled or in pairs. Perianth of 2 opposite compressed membranous sepals. Anthers 2–8, on a central column, 2-celled, opening by a short slit at the apex. FEMALE FLOWERS usually in pairs, sometimes 3 or solitary, each flower consisting of 1 ovule with a single integument prolonged into a styliform

tube (*tubillus*) and enclosed in a bag (? perianth), each female inflorescence supported by several pairs of decussate bracts. Fruit (in the Indian species) fleshy, consisting of several succulent bracts enclosing 1 or 2 seeds.—DISTRIB. Dry regions of Europe, N. Africa, Asia, and America; species 31.

1. **Ephedra foliata,** *Boiss. Fl. Orient.* v. 5 (1881) p. 716. A dicœcious or monœcious climbing shrub reaching 15 ft. long or more (rarely prostrate or hanging from walls); branches often fascicled, slender; bark green or glaucescent, smooth, striate; buds terminal, minute, shortly ovate or more or less elongate. Leaves 2, 3, or 4, shortly connate at the base, 1–1½ in. long by $\frac{1}{25}$ in. broad, linear-setaceous. MALE FLOWERS: Spikelets ovate, obtuse, tetragonal, in pairs, or 3 together, or solitary, of various lengths, often with a peduncle 1–1½ in. long; flowers 6–24; bracts rotund, obtuse, connate for ⅓–½ their length, $\frac{1}{16}$–$\frac{1}{12}$ in. long and as broad as long. Perianth obovate, exceeding the bracts. Staminal-column equalling the perianth or shortly exserted. FEMALE FLOWERS: Floral galbuli in depauperate usually nodding cymes, ovate, on long peduncles or in short fascicles, with 3 pairs of bracts. Flowers usually in pairs, equalling the bracts. Integument at first oblong, obtusely trigonous; tubillus exserted, straight, short. Fruit globose, ¼ in. in diam., semitransparent, red or milky-white, showing 2 dark-colored seeds. Stapf, Die Art. der Gatt. Ephed. (1889) p. 49. *Ephedra pedunculáris*, Boiss. Fl. Orient. v. 5 (1881) p. 717; Hook. f. Fl. B. I. v. 5, p. 641; Talb. Trees, Bomb. ed. 2, p. 337; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Watt, Dict. Econ. Prod. v. 3, p. 251. *E. Alte*, Brandis, For. Flor. p. 501, t. 69 (*not* of C. A. Meyer).—Flowers: Mar.–Apr.

In the Bombay Presidency confined to Sind. SIND: *Woodrow, Stocks*, 449!; hills at the Hub near Karachi, *Bhola Puran*!; near Schwan, *Dalzell*, 7!—DISTRIB. India (Panjáb, Rajputana); Afghanistan to Syria.

2. GNETUM, Linn.

Evergreen climbing shrubs or erect trees; branches jointed. Leaves opposite, entire, penninerved. Flowers monœcious or dicœcious, whorled, in the axils of the cupular bracts of axillary or terminal solitary or paniculate spikes, often surrounded by jointed hairs. MALE FLOWERS: Perianth narrowly clavate, entire or valvately 2-fid. Stamens adnate to the base of the perianth; filaments connate in a column, exserted from the mouth of the perianth; anther-cells 2, distinct, sessile on the top of the column, opening by terminal slits. FEMALE FLOWERS (some imperfect): Ovule ovoid or globose, the inner integument produced into a slender exserted tube with often a toothed or fimbriate mouth. Seed drupe-like.—DISTRIB. Tropical Asia, Africa, America, Pacific Islands; species about 15.

1. **Gnetum scandens,** *Roxb. Hort. Beng.* (1814) p. 66. A lofty dicœcious climber with dichotomous branches; bark thick, scaly; young shoots jointed and swollen at the insertion of the leaves. Leaves opposite, 4½–6 by 2–3 in., ovate-oblong or elliptic, obtusely acuminate, smooth and polished, base obtuse or very shortly cuneate; main nerves 6–8 pairs, slender, with lax reticulate venation between; petioles ¼–½ in.

long. Flowers in stiff paniculate spikes (generally one or two opposite pairs of cylindric spikes and a terminal one); bracts of the male flowers closely imbricate, those of the female interrupted. Fruiting spikes 3–10 in. long. Stigma 3-fid. Fruit somewhat olive-shaped, drupaceous, 1–1½ in. long, of a reddish-orange color when ripe, obtuse at the apex, narrowed at the base into a short stout stalk, the pulp intermixed with many tender spicules. Fl. B. I. v. 5, p. 642; Grah. Cat. p. 188; Dalz. & Gibs. p. 246; Talb. Trees, Bomb. ed. 2, p. 337; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Prain, Beng. Pl. p. 991; Watt, Dict. Econ. Prod. v. 3, p. 518.—Flowers: Dec.–Mar. VERN. *Kombal*; *Umbli*.

KONKAN: *Law*!, *Dalzell*!; dense jungles below the Ghâts, *Dalzell*! DECCAN: ravines at Par, below Mahableshwar, *Graham*; Lanoli, *Graham*, *Woodrow*; Phonda Ghât, *Ritchie*, 954! S. M. COUNTRY: Castlerock, *Kanitkur*! KANARA: common in the moist forests of N. Kanara, abundant in the evergreen forests of the Supa Ghât, *Talbot*.—DISTRIB. India (Sikkim, Assam, Khasia Hills, Chittagong, Birma, Andamans, W. Peninsula); Malay Peninsula and Archipelago, China.

ORDER CXXI. CONIFERÆ.

There are no plants of the Order indigenous to the Bombay Presidency. The following are the principal species grown in gardens:—

Cupressus glauca, Lam. Encyc. Méthod. v. 2 (1786) p. 243. A tree of very upright habit, with numerous short branches covering the stem, extensively grown as an ornamental tree, but does not succeed below the Ghâts and above only when the soil is rich and deep (*Dalzell & Gibson*). It is known as the *Goa Cypress* or *Cedar of Goa*. Fl. B. I. v. 5, p. 645; Grah. Cat. p. 196; Dalz. & Gibs. Suppl. p. 83; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517, & Gard. in Ind. ed. 5, p. 459; Watt, Dict. Econ. Prod. v. 2, p. 646.

Cupressus sempervirens, Linn. Sp. Pl. (1753) p. 1002. A tall tree, attaining 100 ft. high and 9 ft. in girth of trunk, a native of Europe. Foliage dark green. Leaves ovate-oblong, convex, with a gland on each side. Fl. B. I. v. 5, p. 645; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517, & Gard. in Ind. ed. 5, p. 459; Watt, Dict. Econ. Prod. v. 2, p. 646.

Cupressus torulosa, D. Don, Prodr. Fl. Nep. (1825) p. 55. A tall tree, a native of the W. Himalaya, attaining 150 ft. high, with a girth of trunk of 17 ft. Leaves $\frac{1}{20}$ in. long, triangular-ovate obtuse, with an oblong gland on either side of the midrib. Fl. B. I. v. 5, p. 645; Dalz. & Gibs. Suppl. p. 83; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Watt, Dict. Econ. Prod. v. 2, p. 646.

Cupressus funebris, Endl. Syn. Conif. (1847) p. 58. A handsome tree, a native of China, attaining 60 ft., with dark green foliage, wide-spreading branches and pendulous distichous branchlets. Fl. B. I. v. 5, p. 646; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517, & Gard. in Ind. ed. 5, p. 459; Watt, Dict. Econ. Prod. v. 2, p. 645.

Juniperus communis, Linn. Sp. Pl. (1753) p. 1040. *The Common Juniper*, occurring in India in the Western Himalaya and distributed to

temperate and subarctic regions in Europe, Asia, N. Africa, and N. America, is sometimes grown in gardens. Fl. B. I. v. 5, p. 646; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517, & Gard. in Ind. ed. 5, p. 459.; Watt, Dict. Econ. Prod. v. 4, p. 552.

Juniperus chinensis, Linn. Mantiss. 1 (1767) p. 127. A dwarf conical bluish-green shrub of slow growth. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517, & Gard in Ind. ed. 5, p. 459.

Araucaria excelsa, R. Br. in Ait. Hort. Kew. ed. 2, v. 5 (1813) p. 412. *The Norfolk Island Pine*, a native of Norfolk Island, a very handsome species with graceful feathery branches. Woodr. Gard. in Ind. ed. 5, p. 458.

Araucaria Cookii, R. Br. ex D. Don, in Trans. Linn. Soc. v. 18 (1841) p. 164. A native of New Caledonia, resembling the last, but of more irregular outline. Woodr. Gard. in Ind. ed. 5, p. 458.

Araucaria Cunninghamii, Sweet, Hort. Brit. ed. 2 (1830) p. 475. A large tree of rapid growth with whorls of branches often 4 feet apart, a native of Queensland. Woodr. Gard. in Ind. ed. 5, p. 458; Watt, Dict. Econ. Prod. v. 1, p. 289.

Araucaria Bidwilli, Hook. Lond. Journ. Bot. v. 2 (1843) p. 503, tt. 18, 19. A native of Australia, with triangular leaves about 1 in. in length. A delicate species in the plains of India, but thrives well in a conservatory covered with coir matting. Woodr. Gard. in Ind. ed. 5, p. 458.

ORDER CXXII. CYCADACEÆ.

There are no plants of the Order indigenous to the Bombay Presidency. The two following species are commonly grown in gardens for ornamental purposes :—

Cycas Rumphii, Miq. in Bull. Sc. Phys. Nat. Néerl. (1839) p. 45. A palm-like evergreen tree with leaves 5–8 ft. in length, abundant in the Malabar and Cochin forests. Fl. B. I. v. 5, p. 657; Prain, Beng. Pl. p. 993; Watt, Dict. Econ. Prod. v. 2, p. 675. *Cycas circinalis*, Roxb. Fl. Ind. v. 3, p. 744 (*not* of Linn.); Dalz. & Gibs. Suppl. p. 83; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517, & Gard. in Ind. ed. 5, p. 461; Watt, Dict. Econ. Prod. v. 2, p. 675.

Cycas revoluta, Thunb. Fl. Jap. (1784) p. 229. A more dwarf species than the former with smaller leaves, a native of Japan. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517, & Gard. in Ind. ed. 5, p. 461; Prain, Beng. Pl. p. 993; Watt, Dict. Econ. Prod. v. 2, p. 675.

ORDER CXXIII. HYDROCHARITACEÆ*.

Aquatic usually submerged herbs. Leaves undivided. Flowers regular, monœcious or diœcious (rarely 2-sexual), enclosed in an entire

* From ὕδωρ water, and χάρις grace. The genitive of χάρις is χάριτος; hence the Order should be written *Hydrocharitaceæ* not *Hydrocharidaceæ*.

or 2-leaved spathe; females solitary; perianth superior. Sepals 3, green or petaloid. Petals membranous or 0. MALE FLOWERS: Stamens 3–12 in 1–4 series; anthers 2-celled. FEMALE FLOWERS: Ovary inferior, 1-celled; placentas 3–6, parietal or intruded, sometimes almost meeting at the axis; ovules numerous on each placenta, anatropous or orthotropous; styles or style-arms 3–12. Fruit globose or ovoid, dry or pulpy (rarely dehiscent). Seeds few or many; albumen 0; embryo smooth or lineate.—DISTRIB. Warm regions of the world; genera 14; species about 40.

Stems branching, leafy; leaves small; spathes small, sessile.
- Leaves whorled; styles undivided; ovules anatropous..... 1. HYDRILLA.
- Leaves scattered; styles notched; ovules orthotropous ... 2. LAGAROSIPHON.

Stems 0, or with stolons only, or a creeping rootstock.
- Leaves all long and narrow, sessile; male scapes many-flowered.
  - Perianth single ..... 3. VALLISNERIA.
  - Perianth double ..... 4. BLYXA.
- Leaves mostly or all petiolate; flowers solitary..... 5. OTTELIA.

1. **HYDRILLA,** Rich.

A submerged leafy fresh-water herb. Leaves short, 3–4-nately whorled or the lower opposite. Flowers minute, dicœcious, the males shortly pedicellate, solitary in a subglobose muricate spathe, the females sessile, 1–2 in a tubular 2-toothed spathe. MALE FLOWERS: Sepals 3, ovate or obovate, green. Petals 3, oblong or cuneiform. Stamens 3; anthers large, reniform, opening elastically. Pistillode minute. FEMALE FLOWERS: Sepals 3, linear, green. Petals 3, narrow. Ovary produced beyond the spathe into a filiform beak, 1-celled; ovules anatropous; styles 2–3, linear, undivided; stigmas fimbriate. Fruit subulate, smooth or muricate. Seeds 2–3, oblong, minute; testa produced at both ends. —DISTRIB. Central Europe, Mauritius, Madagascar, Tropical Asia and Australia; species 1.

1. **Hydrilla verticillata,** *Presl, Bot. Bemerk.* (1844) p. 112. Fresh-water plants forming large masses; stem slender, 1 ft. and more long, with fibrous roots, much branched, flaccid, with long or short internodes, often rooting from the nodes; branches with a short sheathing leaf at the base. Leaves $\frac{1}{4}$–$\frac{3}{8}$ by $\frac{1}{12}$–$\frac{1}{8}$ in., sessile, 4–8 in a whorl (the lowest often opposite), linear or linear-oblong, apiculate, entire or serrulate; midrib strong. Flowers $\frac{1}{6}$–$\frac{1}{4}$ in. long; perianth-segments very variable. Fruit smooth or muricate. The little membranous spathe of the male flowers ultimately splits and liberates the flower, which rises to the top of the water, where it floats, expands, and scatters its pollen. Fl. B. I. v. 5, p. 659; Dalz. & Gibs. p. 277; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Prain, Beng. Pl. p. 995; Watt, Dict. Econ. Prod. v. 4, p. 310. *Hydrilla ovalifolia,* Rich. in Mém. Inst. Fr. v. 12, part 2 (1811) p. 76, t. 2; Trim. Fl. Ceyl. v. 4, p. 123. *Serpicula verticillata,* Linn. f. Suppl. (1781) p. 416; Roxb. Cor. Pl. v. 2 (1798) p. 33, t. 164; Fl. Ind. v. 3, p. 578.—Flowers: Dec.

Common in tanks throughout the Presidency. KONKAN: Uran (Bombay Harbour), *Stocks*! DECCAN: Tanks near Poona, *Cooke!, Woodrow*; Bijapur, *Cooke*! SIND: Manchar Lake, *Stocks,* 1197!—DISTRIB. Of the genus.

2. LAGAROSIPHON, Harv.

Submerged fresh-water herbs. Leaves scattered, fasciculate or subverticillate, serrulate, the lower sometimes opposite. Flowers dicœcious; the males minute, many, in an ovoid 2-fid axillary sessile spathe, the females solitary, sessile in a narrow oblong spathe. Sepals 3, petaloid. Petals rather shorter than or as long as the sepals. MALE FLOWERS: Stamens 2 or 3; filaments short; anthers ovate; staminodes often 2–3. Pistillode 0. FEMALE FLOWERS: Staminodes 0. Ovary oblong, produced into a filiform beak; ovules many, orthotropous; styles 3, stout, notched. Fruit ovoid, oblong or linear; pericarp membranous. Seeds numerous; testa with a mucous coat.—DISTRIB. India, Africa, Madagascar; species 9 or 10.

1. **Lagarosiphon Roxburghii,** *Benth. in Gen. Pl.* v. 3, part 2 (1883) p. 452. Stem 2–3 ft. long, filiform; roots fibrous; upper branches floating. Leaves 3–4 by $\frac{1}{4}$ in., alternate and opposite, sessile, oblong-lanceolate, acute, minutely serrulate. MALE FLOWERS: Spathe ovoid, at length 2-valved, enclosing many minute, shortly pedicellate flowers. Sepals broadly oblong, pink. Petals as long as the sepals or nearly so, white. Stamens 2; anthers dehiscing transversely. FEMALE FLOWERS: Spathe $\frac{1}{8}$ in. long, tubular, 2-fid. Ovary lanceolate, produced into a filiform flexuous beak 2–3 in. long. Fl. B. I. v. 5, p. 659; Trim. Fl. Ceyl. v. 4, p. 124; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Prain, Beng. Pl. p. 995. *Nechamandra Roxburghii*, Planch. in Ann. Sc. Nat. sér. 3, v. 11 (1849) p. 78 (*exclud. syn.* Roxb. Cor. Pl.); Dalz. & Gibs. p. 277. *Valisneria alternifolia*, Roxb. Hort. Beng. (1814) p. 71; Fl. Ind. v. 3, p. 750; Wight, in Hook. Bot. Misc. v. 2, p. 344, Suppl. t. 11; Grah. Cat. p. 199.—Flowers: Aug.–Feb.

Tolerably common in tanks throughout the Presidency.—DISTRIB. Throughout India; Ceylon, Tropical Asia.

3. VALLISNERIA, Linn.

A submerged tufted stemless stoloniferous herb. Leaves very long, linear. Flowers dicœcious, the males many, minute, in an ovoid 3-lobed, shortly pedunculate spathe, the females solitary in a tubular 3-toothed spathe terminal on a very long filiform spiral scape. Sepals 3. Petals 0. MALE FLOWERS: Stamens 1–3; filaments rather thick; anthers didymous. Pistillode 0. FEMALE FLOWERS: Staminodes 3, each 2-fid. Ovary narrow, not produced upwards; ovules numerous; stigmas 3, broad, notched. Fruit linear, included in the spathe. Seeds numerous, oblong; testa membranous.—DISTRIB. Species about 4, in the warmer regions of both hemispheres.

1. **Vallisneria spiralis,** *Linn. Sp. Pl.* (1753) p. 1015. Leaves radical, narrow, linear, varying in length with the depth of the water, reaching sometimes 15 by $\frac{1}{2}$ in., green, translucent, entire or the tips serrulate. MALE FLOWERS numerous, minute. Spathe shortly pedunculate, $\frac{1}{4}$ in. long, breaking off at the base when the flowers emerge and float on the surface of the water. Pedicels long, slender. Stamens 1–3. FEMALE FLOWERS solitary. Spathe 3-toothed, carried to the surface of the water in flower by the uncoiling of the long filiform spiral scape,

which, after fertilization, again coils close and brings the ovary down to ripen under water. Fruit linear, included in the spathe, many-seeded. Fl. B. I. v. 5, p. 660 ; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Prain, Beng. Pl. p. 996 ; Watt, Dict. Econ. Prod. v. 6, part 4, p. 220. *Vallisneria spiraloides*, Roxb. Hort. Beng. (1814) p. 71; Grah. Cat. p. 200.—Flowers : Apr.–May. VERN. *Saivala.*

More or less abundant throughout the Presidency. KONKAN: *Law*! DECCAN; Poona, *Woodrow* ; Kirkee, in the Mula River, *J. G. Woodrow* ! SIND: *Stocks*!, *Ritchie*, 695!—DISTRIB. Throughout India; westward to Spain and in warm regions of the Old and New Worlds.

4. **BLYXA,** Noronha.

Annual submerged tufted scapigerous herbs. Leaves linear, acute, entire or minutely serrulate. Flowers hermaphrodite or dicœcious; scapes long or short; males pedicellate, several in a tubular 3-toothed spathe; hermaphrodite or female flowers solitary sessile, within a tubular 2-toothed spathe. Sepals 3, linear. Petals 3, linear, longer than the sepals. MALE FLOWERS: Stamens normally 3-seriate, 1 or more often reduced to staminodes; anthers narrow, erect. Pistillodes 3, slender. FEMALE FLOWERS: Staminodes 0 or minute. Ovary linear, 1-celled, beaked; placentas parietal; ovules many ; style very short; stigmas 3, filiform. Fruit linear, included in the ribbed narrow ventricose spathe; pericarp membranous. Seeds numerous, oblong, smooth or tuberculate, often tailed.—DISTRIB. Tropical Asia, Australia, Sumatra; species 7 or 8.

Flowers dicœcious ; seeds with short tails.	
Leaves broad at the base, 8–24 in. long, narrowed upwards to the acuminate tip; seeds $\frac{1}{24}$ in. long, tuberculate ...	1. *B. Roxburghii.*
Leaves narrowed from below the middle to the base, 4–6 in. long ; seeds $\frac{1}{8}$ in. long, strongly echinate	2. *B. Talboti.*
Flowers hermaphrodite; seeds with long filiform tails	3. *B. echinosperma.*

1. **Blyxa Roxburghii,** *Rich. in Mém. Inst. Fr.* (1811) p. 77, t. 5. Leaves 8–24 by $\frac{1}{4}$–$\frac{1}{2}$ in., radical, linear, broad at the base, finely acuminate at the apex. Flowers dicœcious, white. MALE FLOWERS: Scape straight, as long as or rather longer than the leaves. Stamens 8; filaments of unequal lengths, shorter than the petals. FEMALE FLOWERS: Scape shorter and thicker than in the male. Fruit 2–4 by $\frac{1}{8}$ in. Seeds small, $\frac{1}{24}$ in. long, distinctly tuberculate, shortly tailed. Fl. B. I. v. 5, p. 660 ; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Prain, Beng. Pl. p. 996. *Vallisneria octandra*, Roxb. Cor. Pl. v. 2 (1798) p. 34, t. 165 ; Grah. Cat. p. 199—Flowers : Feb.

In still water throughout the Presidency, tolerably common.—DISTRIB. Tropical Asia and Australia.

2. **Blyxa Talboti,** *Hook. f. Fl. B. I.* v. 5 (1888) p. 661. Leaves 4–6 by $\frac{1}{8}$–$\frac{3}{8}$ in., linear-lanceolate, serrulate. Flowers 1-sexual. Capsules 1–2 by $\frac{1}{8}$ in. Seeds very strongly echinate with a short tail at each end. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517.—Flowers : Aug.

There is but one sheet in Herb. Kew., the specimens on which are female plants only. I have not seen any male flowers.

KANARA: Karwar, *Talbot*, 287!

3. **Blyxa echinosperma,** *Hook. f. Fl. B. I.* v. 5 (1888) p. 661. An annual almost stemless herb growing in shallow and deep water. Leaves variable in length, 6 in. to 4 ft. long by $\frac{1}{8}$–$\frac{1}{2}$ in. broad, narrowly linear, with entire or (under the lens) minutely denticulate margins. Flowers hermaphrodite, 1 in each spathe. Scapes filiform, elongate, 1–3 ft. long or more, depending on the depth of water. Sepals 3, narrowly linear, obtuse, greenish. Petals white, often spirally twisted at the tip. Stamens 3. Stigmas 3. Capsules 2–3 by $\frac{1}{8}$ in., terete. Seeds spinescent, sometimes $\frac{1}{2}$ in. long (including the tails), with a long filiform tail at each end. At the time of flowering the deep-water plants become detached from the bottom and float on the surface (*Talbot*). Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 517; Prain, Beng. Pl. p. 996. *Hydrotrophus echinospermus*, C. B. Clarke, in Journ. Linn. Soc. v. 14 (1875) p. 8, t. 1.—Flowers: July–Oct.

Stocks without locality in Herb. Kew.! DECCAN: Mahableshwar, *Cooke*!, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 1392! KANARA: Yellapur, common in tanks, *Talbot*, 287!—DISTRIB. India (Bengal, W. Peninsula).

5. OTTELIA, Pers.

Submerged or partially floating fresh-water herbs; root fibrous. Leaves radical, crowded, of 2 forms, the submerged narrow, shortly petiolate, the floating ovate-lanceolate, oblong or cordate with long petioles. Flowers solitary, hermaphrodite, sessile within a tubular long-pedunculate spathe. Sepals 3, linear or oblong. Petals 3, longer than the sepals, obovate or orbicular, with fleshy basal appendages. Stamens 6–15, in 2–5 series; anthers erect. Ovary oblong, beaked, almost 6-celled; ovules many; placentas diffuse; styles 6, linear, 2-fid. Fruit oblong, enclosed in the spathe, 3–6-winged. Seeds many, oblong; testa pulpy.—DISTRIB. Species 6 or 7, tropical and subtropical.

1. **Ottelia alismoides,** *Pers. Syn. Pl.* v. 1 (1805) p. 400. A succulent flaccid herb; roots fibrous. Leaves usually submerged, very variable, 2-6 by 1–3 in. (when orbicular reaching 7 in. in diam.), oblong or orbicular, cordate, membranous, undulate, 7–11-nerved; petioles 3-gonous, their length depending on the depth of the water. Flowers solitary. Spathe 1–1½ in. long, 5–6-winged; peduncles varying in length with the depth of water; wings of spathe undulate, unequal; mouth 5–6-toothed. Sepals small, oblong, green. Petals nearly orbicular, 1 in. broad, white with a yellow base, reticulately veined. Ovary narrowly oblong; placentas 6–12. Fruit 1–1½ in. long, ellipsoid, crowned by the withered perianth. Fl. B. I. v. 5, p. 662; Trim. Fl. Ceyl. v. 4, p. 125; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Prain, Beng. Pl. p. 997. *Ottelia indica*, Planch. MS. ex Dalz. & Gibs. Bo. Fl. (1861) p. 278. *Damasonium indicum*, Willd. Sp. Pl. v. 2 (1799) p. 276; Grah. Cat. p. 200; Bot. Mag. t. 1201.—Flowers: Dec.–Apr.

Common in tanks, *Dalzell & Gibson*. KONKAN: *Stocks*; Bombay, *Nimmo* ex *Graham*. DECCAN: Poona, *Woodrow*; Bijapur, *Cooke*!; Kolhapur, *Cooke*! GUJARAT: Bulsar, *Dr. Lush* ex *Graham*.—DISTRIB. Throughout India; Ceylon, Tropical Asia, Australia.

Order CXXIV. BURMANNIACEÆ.

Erect herbs, annual or with a perennial rootstock, simple or sparingly branched. Leaves chiefly radical or reduced to scales or 0. Flowers hermaphrodite, regular, solitary, terminal, or unilaterally spicate or racemose on a forked rhachis with a bract opposite each. Perianth superior, corolline, persistent, 6-lobed or 6-cleft (rarely 3-lobed); lobes valvate. Stamens 3 or 6, included, adnate to the perianth-tube or throat; filaments very short or 0; anthers 2-celled, dehiscing transversely or longitudinally. Ovary inferior, 3-celled with axial placentas, or 1-celled with 3 parietal placentas; ovules many, minute. Fruit a loculicidal capsule, or opening vertically. Seeds many, minute, reticulate; albumen 0; embryo homogeneous.—Distrib. Throughout warm regions in both hemispheres; genera 10; species 54.

1. BURMANNIA, Linn.

Annual herbs; stems simple or divided. Leaves ensiform, acuminate, radical, sometimes reduced to scales or 0. Flowers solitary or few. Perianth-segments 2-seriate, connate in a winged or angled tube; segments of outer series 3, of inner also 3, smaller, sometimes obsolete. Stamens 3, sessile or subsessile; anther-cells short, separated by a broad connective, dorsally crested, dehiscing transversely. Ovary 3-celled; style short; stigma 3-lobed. Fruit a capsule more or less 3-winged, opening loculicidally between the wings, or sometimes rupturing transversely. Seeds minute, oblong or subglobose.—Distrib. Tropics of both hemispheres; species about 20.

1. **Burmannia cælestis,** *Don, Prodr. Fl. Nep.* (1825) p. 44. Var. **pusilla,** *Trim. Fl. Ceyl.* v. 4 (1898) p. 131. Stem 3–6 in. (rarely reaching 7 in.) high, very slender. Leaves very few, scale-like, sessile along the stem, $\frac{1}{10}$–$\frac{1}{6}$ in. long, lanceolate-subulate. Flowers $\frac{1}{4}$–$\frac{1}{2}$ in. long, obcordate or orbicular in outline, blue or purple, solitary or 2–3 together (often 3 when the central flower is sessile, the others stalked). Calyx-tube winged, the wings rounded, truncate or retuse at the top. Petals minute.—Flowers: Sept.–Oct.

This is the common form. I have never seen a specimen of *B. cælestis proper* from the Bombay Presidency. *Burmannia pusilla* (sp.), Thw. Enum. p. 325; Hook. f. Fl. B. I. v. 5, p. 665; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518. *B. triflora*, Roxb. Fl. Ind. v. 2 (1832) p. 117 in part; Dalz. & Gibs. p. 271. *B. disticha*, Grah. Cat. p. 223 (*not* of Linn.). *Gonyanthes pusilla*, Miers, in Trans. Linn. Soc. v. 18 (1841) p. 537, t. 38, fig. 3.

Konkan: hot springs near Mahar, *Dalzell & Gibson*; Matheran, *Cooke*!, *H. M. Birdwood*. Deccan: Mahableshwar, *Cooke*!, *Woodrow*! S. M. Country: Castlerock, *Talbot*, 2588!

Order CXXV. ORCHIDACEÆ.

Herbs (rarely shrubby), usually either (1) terrestrial often tuberous-rooted with annual herbaceous leafy or leafless simple stems and with solitary or spicate or racemose flowers, or (2) epiphytes with perennial stems or branches usually leafy, variously thickened and often forming a

pseudobulb, flowering from the top, sides, or base of the pseudobulb; bracts usually present. Flowers hermaphrodite, irregular, often showy. Perianth superior, of 6 free or variously connate segments, 2-seriate; 3 outer segments (*sepals*) more or less similar, the 2 lateral sometimes connate in a short or long sac or spur-like base (*mentum*); 3 inner segments dissimilar, the 2 lateral alike and often resembling the sepals, the remaining petal (*lip*) usually very differently shaped. Stamens and style united in a column opposite the lip; anther usually 1 (sometimes 2) on the front, top, or back of the column and free or adnate to it, 2-celled or, by subdivision, 4-celled; top of the column sometimes produced towards the lip into a beak (*rostellum*); pollen-grains usually coherent in each cell into 1, 2, or 4 pairs of oblong or globose or pyriform waxy or powdery masses (*pollinia*), which are free or adnate by pairs or fours immediately or by a stalk (*caudicle*) to a gland. Ovary inferior, 1-celled, usually linear or twisted; ovules many, minute; stigma one or two viscid spots on the top or concave face of the column, opposite the lip and below the anther. Fruit a capsule, usually opening by 3 or 6 longitudinal fissures (rarely fleshy and subindehiscent). Seeds very many, minute, with a lax hyaline testa enclosing a homogeneous nucleus.—DISTRIB. Genera 340; species about 5000, temperate and tropical (rarely arctic).

Pollinia waxy.
- Pollinia free or those of each cell held together at the base by a viscid appendage, not attached by their bases or by a caudicle to the rostellum.
  - Pollinia 4.
    - Leaves equitant ..... 1. OBERONIA.
    - Leaves not equitant.
      - Terrestrial or epiphytic herbs; leaves membranous, usually sessile; inflorescence terminal; flowers rather small, in racemes or spikes; column prolonged below into a foot.
        - Lip with basal auricles; column very short with broad arms; terrestrial herbs ..... 2. MICROSTYLIS.
        - Lip without basal auricles; column long with callosities or wings or both; rostellum sometimes double; terrestrial or epiphytic herbs ..... 3. LIPARIS.
      - Epiphytic herbs; leaves chartaceous or coriaceous; column more or less prolonged below into a foot.
        - Stems solitary or cæspitose or composed of discrete pseudobulbs basally attached on a short or long rhizome.
          - Flowers from the stems or pseudobulbs, terminal or axillary, solitary or on short -flowered peduncles or in few- or many-flowered racemes, usually large and showy; stems cæspitose with more than 2 leaves, rarely a creeping rhizome with distant pseudobulbs and binary or solitary apical leaves; pollinia all subequal, always free; lip rarely mobile ..... 4. DENDROBIUM.

Flowers from lateral scapes rising from the base of the pseudobulbs or from the rhizome between them, solitary or in heads, umbels, or racemes; leaves solitary and coriaceous, or binary and chartaceous, usually from the apices of pseudobulbs on a generally prolonged rhizome (occasionally the rhizome and less often the pseudobulbs inconspicuous or absent); pollinia free or occasionally attached by their bases to a small ball of translucent tissue, the inner pair always smaller than the outer.

Lateral sepals greatly exceeding the dorsal; flowers umbellate ..... 5. CIRRHOPETALUM.

Lateral sepals not greatly exceeding the dorsal.

Lateral sepals alongside or under the lip; flowers racemose or spicate; pollinia free ..... 6. BULBOPHYLLUM.

Lateral sepals spreading; scape 1-flowered; pollinia subcoherent in pairs in each cell ..... 7. TRIAS.

Stems jointed, composed of elongated pseudobulbs strung on a woody core; leaves solitary or binary, chartaceous; flowers in racemes; column footless . 8. PHOLIDOTA.

Tufted stemless herbs; leaves radical; pseudobulbs 0; flowers in panicles; column footless ..... 9. JOSEPHIA.

Pollinia 8.

Epiphytic pseudobulbous herbs, usually small; inflorescence lateral or terminal, racemose or capitate; flowers with a mentum; column prolonged below into a foot; lip incumbent on the foot of the column; pollinia subequal, all cohering or cohering by fours to a common membrane.

Sepals connivent at the base, all or the lateral only connate; pseudobulbs small, discoid, reticulate ..... 10. PORPAX.

Sepals and petals free; pseudobulbs not discoid..... 11. ERIA.

Epiphytic or terrestrial herbs; stems slender or equally thickened along their whole length; leaves distichous, lanceolate, glaucous; lip adnate to the base of the footless column, shortly spurred; side lobes involving the column; midlobe fringed; pollinia attached by fours to a granular membrane..... 12. THUNIA.

Pollinia 2 or 4, attached singly or in pairs or fours by one or rarely two caudicles to a viscid gland derived from the stigma.

Pollinia 2.

Stem pseudobulbous or tuberous at the base.

Terrestrial herbs; flowers in pedunculate racemes; leaves plicate.

Lip distinctly 3-lobed, saccate or spurred at the base; inflorescence strict ..... 13. EULOPHIA.
Lip obscurely 3-lobed, wide-ventricose, but not spurred at the base; inflorescence at first decurved ..... 14. GEODORUM.
Epiphytic herbs with long linear sheathing leaves on usually a large fleshy pseudobulb; lobes of the lip embracing the unwinged column ..... 15. CYMBIDIUM.
Stem not pseudobulbous nor tuberous at the base.
Column prolonged into a foot.
Spur erect or parallel to the blade of the lip, pointing forwards; lip adnate to the produced foot of the column; side lobes of lip erect; foot of column long ..... 16. SARCOCHILUS.
Spur saccate, laterally compressed; side lobes of lip 0; foot of column small. 17. RHYNCHOSTYLIS.
Spur conical, usually more or less elongated, erect or curved under the midlobe of the lip; foot of column large ..... 18. ÆRIDES.
Column not prolonged into a foot.
Lip not spurred nor saccate.
Leaves terete; flowers in short spikes; caudicle of pollinia broad ..... 19. LUISIA.
Leaves lorate; flowers in racemes with very long simple or branched peduncles; caudicle of pollinia long, narrow ..... 20. COTTONIA.
Lip spurred or saccate.
Side lobes of lip large; flowers large ..... 21. VANDA.
Side lobes of lip small or 0.
Spurs 2, collateral ..... 22. DIPLOCENTRUM.
Spur or sac single.
Spur not septate within; flowers corymbose, fleshy, rigid, not flexible. 23. ACAMPE.
Spur septate within; flowers in extra-axillary racemes or panicles, flexible ..... 24. SARCANTHUS.
Pollinia powdery or lamellate, never waxy.
Anther terminal; pollinia 2 or 4, cohering by their sides, without either gland or caudicle; leaf solitary, appearing after the flowers; small terrestrial erect green herbs ..... 25. POGONIA.
Anther posticous, vertical, but inverted; pollinia 2, or 4 in 2 pairs, attached occasionally directly but usually by one or two caudicles to a single gland.
Stigma single, anticous; pollinia 4, short, clavate, inserted without a caudicle on a small elongate gland; lip neither clawed nor spurred ..... 26. SPIRANTHES.
Stigmas 2, lateral, distant; pollinia 2, bipartite; lip clawed beyond the spur or sac; leaves membranous.
Sepals free ..... 27. ZEUXINE.
Sepals connate to the middle into a tube ..... 28. CHEIROSTYLIS.

Anther-cells sessile on the column, remote or contiguous, always discrete; pollinia 2, sometimes 2-partite, adnate with or without caudicles to separate glands; leaves membranous; terrestrial herbs.
- Sepals subequal and more or less connivent; petals equal to or shorter than the sepals ..... 29. PERISTYLUS.
- Sepals unequal, the lateral ones more or less spreading.
  - Stigmas sessile or subsessile, confluent or more or less distinct ..... 30. PLATANTHERA.
  - Stigmas more or less distinctly stalked, very rarely confluent ..... 31. HABENARIA.

1. **OBERONIA,** Lindl.

Epiphytic herbs with usually very short often tufted stems. Leaves coriaceous or fleshy, usually ensiform, always distichous and equitant. Flowers minute, numerous, in dense subcylindric spikes or racemes, expanding centrifugally. Sepals ovate or oblong, subequal. Petals as wide as or narrower than the sepals. Lip larger than the sepals, sessile, more or less concave, usually lobed and often erose. Column very short, stout. Anther terminal or incumbent; pollinia 4, cohering in pairs, waxy.—DISTRIB. Species about 60, Tropical Asiatic, Australian, and Pacific.

Petals broad, ovate or obovate.
- Petals ovate; lateral lobes of lip small; midlobe 2-fid with a broad sinus; flowers greenish-yellow ..... 1. *O. Falconeri.*
- Petals obovate; lateral lobes of lip large, orbicular; midlobe 2-fid with a narrow sinus; flowers brick-red ..... 2. *O. recurva.*

Petals linear ..... 3. *O. Brunoniana.*

1. **Oberonia Falconeri,** *Hook. f. Icon. Pl.* (1888) t. 1780. Leaves coriaceous, broadly ensiform, acute, subfalcate, 1–2 by $\frac{1}{4}$–$\frac{1}{2}$ in., the lower becoming gradually smaller. Scape terete, shorter than the leaves, robust; bracts numerous, ovate-lanceolate or oblong, serrulate, slightly shorter than the flowers. Flowers about $\frac{1}{20}$ in. across, greenish-yellow, numerous, shortly pedicellate, in a dense raceme 3–5 in. long; rhachis stout. Sepals broadly ovate. Petals ovate, obtuse. Lip linear-oblong; side lobes small, rounded or tooth-like; midlobe 2-fid at the apex, the lobules narrow, parallel or incurved, subacute, with a subtruncate broad sinus. Capsules shortly pedicellate, deeply ribbed, $\frac{1}{8}$–$\frac{1}{6}$ in. long. Fl. B. I. v. 5, p. 678; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Prain, Beng. Pl. p. 1003; Gammie, in Journ. Bomb. Nat. v. 16, part 4 (1905) p. 564. *Oberonia iridifolia,* Wall. Cat. 1948 (1 and 3) in part (*not* of Lindl.).—Flowers: Sept.–Oct.

KONKAN: *Law* !, *Woodrow* !; Kalyan, *Millard* ex *Gammie.*—DISTRIB. India (Nepal Behar, Chota Nagpur, Dehra Dun, W. Peninsula).

2. **Oberonia recurva,** *Lindl. in Bot. Reg.* (1839) *Misc.* No. 8. A small plant 2–3½ in. high to top of inflorescence. Leaves 1–1¾ in. long, thin, pale green, oblong-lanceolate, acuminate, nearly straight. Scape short, terete; bracts lanceolate, shorter than the flowers, entire or subcrenulate. Flowers $\frac{1}{30}$ in. across, hyaline, sparsely gland-dotted, pale brick-red, pedicellate, in slender dense-flowered racemes 1½–2½ in. long. Sepals broadly triangular-ovate, obtuse. Petals obovate-oblong, obtuse,

irregularly toothed. Lip usually longer than the sepals, the margins crenate or erose; side lobes large, orbicular; midlobe obcordate, 2-lobulate, with usually a narrow sinus. Capsules $\frac{1}{5}$ in. long, ovoid or subobovoid, with elongate pedicels as long as the capsules. Fl. B. I. v. 5, p. 680; Dalz. & Gibs. p. 260; Trim. Fl. Ceyl. v. 4, p. 137; Hook. f. Icon. Pl. (1888) t. 1784 A; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 16, part 4 (1905) p. 564. *Oberonia setifera*, Lindl. Fol. Orchid. [*Oberonia*] (1859) p. 3.—Flowers: Feb.-Apr.

Throughout the Ghâts and Konkan, *Gammie*. KONKAN: *Law*!, *Dalzell*! DECCAN: Mahableshwar, *Cooke*!, *Woodrow*, *H. M. Birdwood*; Khandala, *Law*, 39!—DISTRIB. India (W. Peninsula).

3. **Oberonia Brunoniana**, *Wight*, *Icon.* v. 5 (1852) p. 3, t. 1622. A large and handsome species. Leaves elongate, 6–14 by $\frac{3}{4}$–$1\frac{1}{4}$ in., linear-oblong, succulent, nearly as long as the inflorescence. Scapes 2–8 in. long, flattened, adnate to the upper leaf, 2-edged; adnate leaf 1–4 in. long, usually falcate at the apex, variable in position; bracts lanceolate, denticulate, acute. Flowers $\frac{1}{6}$ in. across, sessile, in dense stiff erect spikes 4–6 in. long, like a rat's tail (*Hooker*). Sepals ovate, subobtuse, reflexed, slightly longer than the petals, brown. Petals linear, subacute, quite entire, pale yellow. Lip brown, cordate at the base, with a concave disk, entire, constricted below the apex which is 2-lobed, sometimes with a small tooth between the lobes. Capsules $\frac{1}{5}$–$\frac{1}{4}$ in. long, sessile or nearly so. Fl. B. I. v. 5, p. 681. This may possibly be the plant which Dalzell & Gibson (Bo. Fl. p. 260) term *O. Lindleyana*.

KONKAN: *Dalzell*! KANARA: Kâla naddi, *Ritchie*, 1405!—DISTRIB. India (W. Peninsula), apparently endemic.

EXCLUDED SPECIES.

OBERONIA PLATYCAULON, Wight, Icon. v. 5 (1852) p. 3, t. 1623. Leaves 6–10 by $\frac{1}{2}$–$\frac{3}{4}$ in., narrowly ensiform, straight, subacute. Scape very broad, flat, adnate to a leaf to the top and almost as broad as the leaf; bracts ovate, sheathing the sessile ovary, erose, obtuse. Flowers whitish or pale yellow, about $\frac{1}{5}$ in. across, in spikes 3–5 in. long with a stout rhachis. Petals narrow, linear, slightly shorter than the sepals. Lips broader than long; side lobes broad, rounded; midlobe 3-toothed, the central tooth the smallest. Capsules sessile or nearly so.

This plant does not appear to have been found in the Bombay Presidency. It seems to belong to the Pulney Hills. Graham does not mention the plant (nor in fact the genus) in his Catalogue, nor do Dalzell & Gibson include it in their 'Flora of Bombay.' Woodrow does not cite it, and Gammie says in his "Orchids of the Bombay Presidency" (Journ. Bomb. Nat. v. 16, p. 564) that he does not know the plant. There are in all 2 sheets in Herb. Kew., one from the Pulney Hills from Wight's Herbarium and one other (also from Wight's Herbarium) without flowers, on which is a ticket apparently written by Wight—"19. *Parasite, rare. I do not know what it is*"; and at the bottom of the sheet in pencil are the words "*Bombay Graham.*" Thus the only evidence as to the occurrence of the plant in Bombay depends on a pencilled note which does not state that the plant was collected in Bombay, but merely sent from there by Graham.

2. MICROSTYLIS, Nutt.

Terrestrial (rarely epiphytic) herbs, pseudobulbous or not. Leaves one or more, membranous, plicate, continuous with their sheaths. Flowers small, resupinate in terminal racemes. Sepals spreading or recurved, subequal. Petals as long as the sepals but narrower. Lip

adnate to the base of the column, usually flat, the basal lobes large, sagittate, and produced upwards; or cup-shaped with small lobes or without basal lobes, the apex emarginate, 2–3-lobed, erose or entire. Column usually very short with 2 spreading arms; anther subterminal, 2-celled; pollinia 4, ovoid or obovoid, waxy.—DISTRIB. Species about 70, chiefly in Tropical Asia and America.

1. **Microstylis versicolor,** *Lindl. Gen. & Sp. Orchid.* (1830) p. 21 (*not* of Wight). Stem 3–6 in. high, slender or robust, stoloniferous, bearing numerous acute sheaths, base swollen or not. Leaves usually drying yellowish-brown, thinly membranous, petiolate, 2½–7 by 1¼–3 in., broadly ovate or elliptic, acute or acuminate, plaited, silvery or purplish beneath, 5–7-nerved, decurrent into a sheathing petiole ½–3 in. long, base usually unequal-sided. Scape with raceme 6–12 in. long; bracts lanceolate, deflexed, about as long as the flowers. Flowers fragrant, ⅛–⅙ in. broad, green, yellow, or purple, in slender racemes. Sepals broadly ovate, obtuse, concave, 1-nerved, the dorsal longest and narrowest. Petals narrowly linear, subobtuse. Lip broader than long, rounded, reniform or fan-shaped, pectinate. Column somewhat constricted in the middle, truncate; arms short or 0. Fruit ⅜ in. long, clavate-oblong, erect, shortly pedicellate. Jackson, Index Kewen. v. 3 (1895) p. 234. *Microstylis Rheedei*, Wight, Icon. v. 3 (1843–45) part 2, p. 9, t. 902. Hook. f. Fl. B. I. v. 5, p. 690; Dalz. & Gibs. p. 260 (*exclud. syn.*); Hook. f. Icon. Pl. t. 1832; Trim. Fl. Ceyl. v. 4, p. 141; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Prain, Beng. Pl. p. 1004; Gammie, in Journ. Bomb. Nat. v. 16, part 4 (1905) p. 565. *Malaxis Rheedei*, Heyne, ex Wall. Cat. (1828) sub n. 1939; Grah. Cat. p. 202.—Flowers: June–Aug.

Lindley's specific name *versicolor* is more than 13 years prior to Wight's name *Rheedei*.

Common on the Ghâts. KONKAN: *Law*!, *Stocks*! DECCAN: Khandala, *Cooke*!; Mahableshwar, *Cooke*!, *Woodrow*, *H. M. Birdwood*; Koina Valley below Mahableshwar, common, *Cooke*! KANARA: *Law*!—DISTRIB. India (Chota Nagpur, W. Peninsula); Ceylon.

3. **LIPARIS,** Rich.

Terrestrial or epiphytic herbs (terrestrial in the Bombay species), pseudobulbous or not. Leaves 1 or more, membranous or coriaceous, continuous with the sheath, or thickened and jointed at the base. Flowers small, in terminal racemes, resupinate or not. Sepals spreading or recurved, the margins usually revolute. Petals as long as the sepals, but much narrower. Lip adnate to the base of the column, usually broad, flat or deflexed from the middle, sometimes concave, often with calli near the base. Column elongate, often arched, usually winged near the apex and tumid or dilated and compressed at the base; anther terminal; pollinia 4.—DISTRIB. Species about 120, in temperate and tropical regions, most numerous in India.

1. **Liparis nervosa,** *Lindl. Gen. & Sp. Orchid.* (1830) p. 26. Terrestrial, 6–15 in. high. Pseudobulbs often present, ovoid. Stem 2–5 in. long, slightly bulbous at the base, bearing several sheaths. Leaves 2 or 3, alternate, sessile, sheathing, 2½–5 by ¾–1¾, elliptic-

lanceolate, acute, narrowed into the amplexicaul sheath, plicate; main nerves 5, with numerous slender parallel veins between. Scape angular, together with the raceme 4–8 in. long; bracts $\frac{1}{8}$–$\frac{1}{3}$ in. long, lanceolate, acute, spreading (not deflexed), shorter than the twisted ovary. Flowers green, tinged with pink or yellow, in erect rigid racemes; rhachis angular, striate. Sepals 5-nerved; dorsal sepal $\frac{1}{4}$ by $\frac{1}{16}$ in., linear-lanceolate, obtusely pointed, with revolute margins; lateral sepals $\frac{1}{6}$ by $\frac{1}{5}$ in., falcate-oblong, recurved. Petals $\frac{1}{4}$ by $\frac{1}{20}$ in., linear, obtuse, with revolute margins, reflexed. Lip $\frac{1}{6}$ in. long and as broad as long, cuneately obovate or subquadrate, often recurved from the middle, tip truncate or slightly obcordate with a minute apiculus, and with 2 calli at the base. Column incurved above the middle, with 2 small rounded wings. Fruit $\frac{1}{2}$–$\frac{3}{4}$ in. long, clavate, very shortly pedicellate. Trim. Fl. Ceyl. v. 4, p. 145; Index Kewen. Suppl. 2 (1905) p. 106. *Liparis paradoxa*, Reichb. f. in Walp. Ann. v. 6 (1861) p. 218; Hook. f. Fl. B. I. v. 5, p. 697; King, in Ann. Roy. Bot. Gard. Calc. v. 8, p. 27, t. 34; Prain, Beng. Pl. p. 1005; ? Gammie, in Journ. Bomb. Nat. v. 16, part 4 (1905) p. 565. *Liparis odorata*, Lindl. Gen. & Sp. Orchid. (1830) p. 26. *Malaxis nervosa*, Sw. in Vet. Akad. Nya Handl. Stockh. v. 21 (1800) p. 235. *Malaxis odorata*, Willd. Sp. Pl. v. 4 (1805) p. 91; Grah. Cat. p. 202.—Flowers: July–Sept.

Rare. KONKAN: *Stocks!*, *Law!* KANARA: *Law!* Gammie [Journ. Bomb. Nat. v. 16, part 4 (1905) p. 565] describes a plant very close to this which was collected by Mr. Spooner on the Belgaum and N. Kanara Ghâts, but the lateral sepals of that plant are described as being similar to the dorsal, which is not the case in the specimens of *L. nervosa* in Herb. Kew. collected by *Stocks* and *Law*.

VAR. *Dalzellii*. More robust, with stems $\frac{2}{3}$ in. in diam., leaves 4–6 by $2\frac{1}{2}$–$2\frac{3}{4}$ in., and much larger flowers. *Liparis Dalzellii* (sp.), Hook. f. Fl. B. I. v. 5 (1890) p. 698: Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 16, part 4 (1905) p. 565.

There is but 1 specimen in Herb. Kew. from the South Konkan supplied by Dalzell, and no one seems to have seen another. Woodrow merely cites the 'Flora of British India,' and Gammie says he does not know the plant. Except its size, I can find no difference between the variety and the typical plant, and I conclude that the variety is merely an accidental luxuriant specimen grown under some peculiar conditions.

4. **DENDROBIUM**, Swartz.

Epiphytic herbs; pseudobulbs short and fleshy or elongated and stem-like, usually tufted. Leaves sessile, never plicate, bases sheathing. Flowers solitary or in fascicles or racemes, often large and showy. Sepals subequal, the latter obliquely adnate to the foot of the column and forming with it a sac or mentum (*spur*). Petals usually like the sepals. Lip sessile or clawed at the base, adnate to and incumbent on the foot of the column; side lobes embracing the column or spreading or 0; terminal lobe broad or narrow, flat, convex, concave or saccate, its disk sometimes lamellate. Column short, its foot long or short with usually a nectar-secreting depression or cavity at its extremity, the apex angled or 2-toothed; anther 2-celled; pollinia 4, equal in length, sometimes in free pairs but usually all slightly coherent, the 4 never all quite free, ovoid or oblong, slightly compressed, waxy.—DISTRIB. Species about 300, Tropical Asiatic, Australasian, and Polynesian.

Stems branched, the branches formed by chains of uninodal sessile or stipitate pseudobulbs. Leaf solitary, terminal, coriaceous, flat, peristent. Flowers 1-3 from the base of the leaf, medium-sized, white or pale, lasting only one day; mentum (*spur*) short; the edge of the lip plicate ... 1. *D. Macræi.*

Pseudobulbs short, tufted, with 2 or 3 leaves; or stems elongate and leafy. Leaves narrow, membranous, deciduous or persistent. Flowers in slender terminal or lateral racemes, small or medium-sized; mentum rather long, conical, incurved, or short and obtuse; lip often with a flat keel on the disk that terminates in a truncate crenate callus on the midlobe.

Stems simple or nearly so, often a small pseudobulb.

Small plants with crowded ovoid pseudobulbs; flowers small, in racemes from the top of the pseudobulb; petals not broader than the dorsal sepal.

Sepals and petals white; lip pink with dark-red veins ..... 2. *D. microbolbon.*

Sepals and petals white; lip yellow-green ..... 3. *D. Mabelæ.*

Larger plants; stems tufted, 10–18 in. long; flowers in terminal and lateral racemes; petals broader than the dorsal sepals.

Lateral sepals oblong; midlobe of lip subquadrate; flowers cream-colored ..... 4. *D. chlorops.*

Lateral sepals lanceolate, falcate; midlobe of lip ovate, acute; flowers white, often with a tinge of pink ..... 5. *D. barbatulum.*

Stems long, copiously branched; flowers small ..... 6. *D. herbaceum.*

Stems elongate, stout or slender, cylindric, clavate or nodose. Leaves membranous or coriaceous, persistent or deciduous. Flowers usually large, in lateral pairs or fascicles or racemes (very rarely solitary), variously colored, white, yellow, or purple.

Mentum (*spur*) half as long as the dorsal sepal; lip longer than broad ..... 7. *D. macrostachyum.*

Mentum less than half as long as the dorsal sepal; lip as broad as long ..... 8. *D. crepidatum.*

1. **Dendrobium Macræi,** *Lindl. Gen. & Sp. Orchid.* (1830) p. 75. Rhizome creeping, annulate, giving off pendulous smooth polished stems 2–3 ft. long, bearing at irregular intervals narrowly fusiform somewhat compressed shining pseudobulbs 2–2½ in. long; internodes long, terete. Leaf terminal from the top of the pseudobulb, solitary, 4–8 by ¾–1 in., linear-oblong, obtuse, with numerous parallel slender veins. Flowers remaining open for a few hours only, 1–3 from near the base of a leaf, ¾–1 in. across, white, the lip and mentum yellow [in the Sikkim specimen figured in the Annals of the Royal Botanic Garden, Calcutta (*l. c.*), the side lobes of the lip are shown pale-pink speckled with red, the middle greenish-yellow]; bracts beneath the flower small, ovate, acute, sheathing. Sepals oblong-lanceolate, subacute, spreading. Mentum (*spur*) short, broad, conical. Petals narrower than the sepals, linear-oblong, obtuse. Lip oblong-obovate in general outline, decurved about the middle, concave; side lobes oblong, obtuse, the disk between them with 2 fleshy crests; midlobe contracted and coarsely erose-crisped at its base, the terminal part expanded and the edges much plicate. Column short with a short foot; pollinia narrowly oblong. Fl. B. I. v. 5, p. 714; Dalz. & Gibs. p. 260; Trim. Fl. Ceyl. v. 4, p. 150; King, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 61. t. 86; Woodr. in Journ. Bomb. Nat.

v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 16, part 4 (1905) p. 566. *Dendrobium nodosum*, Dalz. in Kew Journ. Bot. v. 4 (1852) p. 292.—Flowers: June–Aug. VERN. *Joivansi.*

DECCAN: Mahableshwar, *Cooke!*; Koina Valley below Mahableshwar, where it forms large masses on the branches of trees, *Cooke!*, *H. M. Birdwood.* S. M. COUNTRY: Rámghát, on Jambul trees, *Dalzell & Gibson.* KANARA: Sampkhand (N. Kanara), *Woodrow.*—DISTRIB. India (Sikkim, Khasia Hills, Birma, W. Peninsula); Ceylon, Java.

2. **Dendrobium microbolbon,** *A. Rich. in Ann. Sc. Nat.* sér. 2, v. 15 (1841) p. 19, t. 8. A small epiphyte. Pseudobulbs small, $\frac{1}{2}$–$\frac{3}{4}$ in. long, ovoid, crowded, covered with a network of fibres formed by decaying membranous sheaths. Leaves usually 2 from the top of the pseudobulb, very soon falling, rather thick, 2–3 by $\frac{1}{4}$–$\frac{3}{8}$ in., oblong-lanceolate, acute. Flowers 4–10, in racemes 1–3 in. long (including the scape); bracts $\frac{1}{10}$–$\frac{1}{8}$ in. long, lanceolate; pedicels and ovary together $\frac{1}{4}$ in. long in flower, slender. Sepals white; lateral sepals $\frac{1}{5}$ in. long by $\frac{1}{10}$ in. broad below the middle from where it is decurrent into the mentum, falcately tapering to a subacute point; dorsal sepal $\frac{1}{4}$ by $\frac{1}{12}$ in., lanceolate, obtuse, veined. Mentum (*spur*) stout, $\frac{1}{5}$ in. long, slightly curved. Petals white, $\frac{1}{4}$ by $\frac{1}{16}$ in., oblanceolate, obtuse. Lip pink with darker veins, $\frac{1}{4}$ in. long and as broad as long, suborbicular in outline, 3-lobed; side lobes small, subacute; midlobe about $\frac{1}{12}$ in. long, truncate or slightly emarginate, crenulate, the disk with a pair of fleshy keels each terminating in front in a short triangular point. Capsules large for the size of the plant, $\frac{1}{4}$ in. long, broadly ellipsoid, smooth (not ribbed), on a slender pedicel $\frac{1}{3}$ in. long. Fl. B. I. v. 5, p. 716; Dalz. & Gibs. p. 261; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 16, part 4 (1905) p. 567. *Dendrobium humile,* Wight, Icon. v. 5, part 1 (1852) p. 5, t. 1643. *D. crispum*, Dalz. in Kew Journ. Bot. v. 4 (1852) p. 111.—Flowers: Dec.–Mar.

KONKAN: *Stocks!*, *Dalzell!*; throughout the Ghâts and Konkan, *Gammie.* DECCAN: Mahableshwar, *Cooke!*, *Fairbank* ex *H. M. Birdwood*; Lanoli, *Woodrow.*—DISTRIB. India (W. Peninsula).

3. **Dendrobium Mabelæ,** *Gammie, in Journ. Bomb. Nat.* v. 16, part 4 (1905) p. 567. Pseudobulbs small, tufted, 2-jointed, ovoid, $\frac{1}{4}$ in. long, or as much as 4-jointed and $1\frac{1}{2}$ in. long, clothed with a network of fibres. Leaves 2, linear-oblong, reaching 3 in. long, moderately firm. Flowers 3–4 or more, in racemes which are longer than the leaves and arising between them; peduncle slender, bracteate at the base and towards the middle; pedicels including the ovary $\frac{1}{4}$ in. long. Sepals white; lateral sepals $\frac{1}{4}$ in. long from a broad base, subfalcate, acute; dorsal sepal rather more than $\frac{1}{4}$ in. long by $\frac{1}{10}$ in. broad, oblong-lanceolate. Petals white, as long as the dorsal sepal, linear-spathulate. Lip yellowish-green with faint rose-colored blotches and streaks (*Gammie*), hinged on the extremity of the foot of the column, suborbicular in outline, $\frac{1}{5}$ in. long; side lobes shallow, obtuse; midlobe suborbicular, $\frac{1}{10}$ in. in diam., fringed with thick white hairs; disk with a channelled ridge which is free and 2-lobed at the end and extending as far as the lateral lobes.—Flowers: Oct.–Dec.

S. M. COUNTRY: Belgaum Ghâts, *Gammie*; Castlerock, *Bhiva!*; Londa, *Bhiva!*—DISTRIB. India (W. Peninsula).

4. **Dendrobium chlorops,** *Lindl. in Bot. Reg.* (1844) *Misc.* p. 44. Stems tufted, 12–18 in. long, usually slender. Leaves on first year's shoots 2–4 by $\frac{1}{4}$–$\frac{1}{2}$ in., lanceolate, acute, the second year's shoots leafless and flower-bearing. Flowers $\frac{3}{4}$ in. in diam., with a primrose-like scent when first expanded, in lateral and terminal racemes 3–6 in. long; pedicels and ovary together reaching $\frac{1}{2}$ in. long in flower, slender; bracts below the pedicels $\frac{1}{8}$ in. long, ovate-lanceolate, acute. Sepals cream-colored; lateral sepals $\frac{1}{3}$ in. long by $\frac{1}{8}$ in. broad at the base, oblong-lanceolate, subacute; dorsal sepal $\frac{1}{3}$ in. long, less than $\frac{1}{8}$ in. broad, oblanceolate, obtuse. Mentum (*spur*) conical, $\frac{1}{5}$ in. long. Petals $\frac{3}{8}$ by $\frac{1}{5}$ in., cream-colored, obovate. Lip flat, rather more than $\frac{3}{8}$ in. long; side lobes small, rounded, greenish; midlobe large, subquadrate, cream-colored; disk pubescent with a channelled ridge. Column greenish; anther white (*Veitch*). Fruit not seen. Fl. B. I. v. 5, p. 719; Dalz. & Gibs. p. 261; Veitch, Man. Orchid. Pl. part 3 (1888) p. 27; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 16, part 4 (1905) p. 568. *Dendrobium barbatulum*, Wight, Icon. t. 910 (*not* of Lindl.). *Cymbidium ovatum*, Willd. Sp. Pl. v. 4 (1805) p. 101; Grah. Cat. p. 203.—Flowers in the cold season.

Throughout the Ghâts and Konkan towards the south, *Gammie*. KONKAN: *Stocks!*, *Law!*; Konkan Ghâts, *Woodrow*. DECCAN: Mahableshwar, *Cooke!*, *H. M. Birdwood*; Phonda Ghât, *Ritchie*, 1410!—DISTRIB. India (W. Peninsula), apparently endemic.

5. **Dendrobium barbatulum,** *Lindl. in Wall. Cat.* (1828) 2013. Stems 10–15 in. long, swollen at the base, tapering towards the apex. Leaves 3–4 by $\frac{1}{2}$ in., lanceolate, acute, deciduous. Flowers white, often suffused with pink, glistening when fresh, in lateral and terminal racemes 3–6 in. long (including the peduncle); pedicels together with the ovary in flower $\frac{1}{2}$ in. long; bracts $\frac{1}{10}$–$\frac{1}{6}$ in. long, lanceolate, scarious. Lateral sepals $\frac{3}{4}$ by $\frac{1}{5}$ in., lanceolate, acute, slightly falcate; dorsal sepal $\frac{3}{4}$ by $\frac{1}{8}$ in., linear-lanceolate, acute. Mentum (*spur*) conical, acute, $\frac{1}{3}$ in. long. Petals $\frac{7}{8}$ by $\frac{1}{3}$ in., broadly lanceolate, acute. Lip $\frac{7}{8}$ in. long, 3-lobed; side lobes $\frac{1}{5}$ in. long, obtuse; midlobe $\frac{5}{8}$ by $\frac{3}{8}$ in., rhomboid-obovate, apiculate, entire, bearded at the base with yellow hairs. Fruit $1\frac{1}{4}$ in. long. Fl. B. I. v. 5, p. 719; Dalz. & Gibs. p. 261; Veitch, Man. Orchid. Pl. part 3 (1888) p. 21; Bot. Mag. t. 5918; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 31.—Flowers: Apr.–May. VERN. *Jadhia-lasan.*

KONKAN: *Stocks!*, *Law!*, *Graham*; Matheran, *Woodrow*, *H. M. Birdwood*. DECCAN: Mahableshwar, common, *Cooke!*—DISTRIB. India (W. Peninsula).

6. **Dendrobium herbaceum,** *Lindl. in Bot. Reg.* (1840) *Misc.* p. 69. A large pendulous epiphyte with much-branched stems 2–3 ft. long; lower part of stem naked and as well as the branches smooth, polished and shining, brown or yellow; branchlets leafy. Leaves 2–4½ by $\frac{1}{4}$–$\frac{3}{8}$ in., linear-lanceolate, acute or subobtuse, caducous. Flowers yellow; racemes terminal, few-flowered, rarely reaching 1 in. long; peduncle $\frac{1}{4}$–$\frac{1}{3}$ in. long; pedicels together with the ovary $\frac{1}{4}$–$\frac{1}{2}$ in. long, filiform; bracts $\frac{1}{12}$–$\frac{1}{8}$ in. long, lanceolate, scarious. Lateral sepals $\frac{1}{4}$ in. long by $\frac{1}{10}$ in. broad at the base, oblong-lanceolate, subacute, slightly falcate; dorsal sepal $\frac{1}{4}$ by $\frac{1}{12}$ in., oblong-lanceolate. Mentum (*spur*) minute, rounded. Petals $\frac{1}{5}$ by $\frac{1}{16}$ in., linear, obtuse. *Lip* $\frac{1}{5}$ by $\frac{1}{12}$ in., oblong, slightly constricted about $\frac{1}{10}$ in. from the apex; side lobes very

narrow or obsolete; midlobe ovate, subacute, entire. Fruit ¾ in. long, ellipsoid, tapering at the base into a stalk ½ in. long, with 3 broad flat ribs and 3 narrow ones. Fl. B. I. v. 5, p. 719; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Prain, Beng. Pl. p. 1006; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 32. *Dendrobium ramosissimum*, Wight, Icon. v. 5, part 1 (1852) p. 6, t. 1648; Dalz. & Gibs. p. 261.—Flowers: Nov.

KONKAN: *Gibson*!, *Dalzell*!, *Stocks*! DECCAN: Mahableshwar, *Woodrow*; Koina Valley below Mahableshwar, abundant, *Cooke*!, *H. M. Birdwood*; Wada below Mahableshwar, *Cooke*!—DISTRIB. India (Bengal, W. Peninsula).

7. **Dendrobium macrostachyum,** *Lindl. Gen. & Sp. Orchid.* (1830) p. 78. Stems many, pendulous, crowded, slender, terete, the leaf-bearing stems 8–20 in. long, the flowering stems longer, sometimes reaching 4 ft. long (*Trimen*). Leaves sessile, sheathing at the base, 2–3½ by ½–⅞ in., oblong-lanceolate, acute, membranous, the sheaths appressed to the stem. Flowers 2–4 from the leafless stems of the previous year's growth, fragrant, very pale green or yellow, often tinged with pink; peduncle short; pedicels with the ovary reaching 1 in. long, slender, often curved; bracts small, ovate, acute, scarious. Lateral sepals ½–⅝ by ⅛–⅙ in., oblong-lanceolate, acute; dorsal sepal similar. Mentum (*spur*) ¼–⅓ in. long, funnel-shaped, obtuse. Petals ½–⅝ by $\frac{1}{10}$–⅛ in., linear-lanceolate, acute. Lip ⅝–¾ in. long and less than ½ in. broad, with a long claw, ovate-oblong, finely pubescent, crenulate on the margin; side lobes small, rounded, often obscure; midlobe quadrately ovate, obtuse, yellow at the tip; disk veined with purple. Fruit 1–1¼ in. long, narrowly fusiform, tapering into the stalk. Fl. B. I. v. 5, p. 735; Wight, Icon. t. 1647; Trim. Fl. Ceyl. v. 4, p. 152; Prain, Beng. Pl. p. 1007; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 32.—Flowers: May.

KONKAN: S. Konkan, *Dalzell*, 45! DECCAN: Koina Valley below Mahableshwar, *Cooke*! S. M. Country: Belgaum Ghâts, *Gammie*. KANARA: *Woodrow*!, *Gammie*. —DISTRIB. India (Chota Nagpur, W. Peninsula); Ceylon.

8. **Dendrobium crepidatum,** *Lindl. & Paxt. Fl. Gard.* v. 1 (1850) p. 63, fig. 45. Stems tufted, almost as thick as the little finger, fleshy, loosely sheathed, 12–18 in. long, jointed at intervals of about 1 in., the internodes marked with longitudinal white lines on a sea-green ground. Leaves 2–5 by ½–⅝ in., linear-lanceolate, acute, falling at the end of the first season. Flowers in fascicles of two or three produced from every joint except the lowermost, of wax-like texture, white tinted with lilac except the disk which is yellow; pedicel together with the ovary reaching 1¼ in. long in flower, pale purple; bracts minute, ovate, acute. Lateral sepals ½ by ⅓ in., oblong-elliptic, rounded at the apex; dorsal sepal similar. Mentum (*spur*) ⅛ in. long, obtuse. Petals ½ by ⅓ in., elliptic, rounded at the apex. Lip ½ in. long and as broad as long, with a yellow disk and white tip, slightly retuse at the apex and with a short claw, plaited at each side at the base forming a slipper-like cavity. Fruit clavate, 1½–2 in. long. Fl. B. I. v. 5, p. 740; Bot. Mag. t. 4993 & t. 5011; Veitch, Man. Orchid. Pl. part 3 (1888) p. 33; Prain, Beng. Pl. p. 1007; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 33. *Dendrobium Lawanum*, Lindl. in Journ. Linn. Soc. v. 3 (1859) p. 10;

Dalz. & Gibs. p. 260. *Dendrochilum roseum*, Dalz. in Kew Journ. Bot. v. 4 (1852) p. 291.—Flowers: Mar.-Apr.

KONKAN: *Law!*, *Dalzell!*, *Stocks!*; near Vingorla, *Dalzell*, 33! DECCAN: Mahableshwar Hills, *Cooke!* S. M. COUNTRY: Belgaum Ghâts, *Gammie*. KANARA: *Gammie*.—DISTRIB. India (Chota Nagpur, Assam, Khasia Mountains, W. Peninsula).

The following plants of the genus are sometimes grown in the Bombay Presidency:—

Dendrobium formosum, Roxb. in Wall. Cat. (1828) 1998. A native of the tropical Himalayas, Assam, the Khasia Hills, and Birma. Stems 12–18 in. long, cylindric, nearly as thick as the little finger. Leaves ovate-oblong, 5 in. long, amplexicaul, unequally 2-lobed at the apex. Flowers white, with an orange blotch on the lip, 3–4 in. in diam. Lip broadly obovate, entire. Fl. B. I. v. 5, p. 721; Veitch, Man. Orchid. Pl. part 3 (1888) p. 44; Bot. Reg. (1838) Misc. p. 49; Prain, Beng. Pl. p. 1006; Woodr. Gard. in Ind. ed. 5, p. 474.

Dendrobium albo-sanguineum, Lindl. & Paxt. Fl. Gard. v. 2 (1852) p. 93. A native of Birma. Stems subcylindric, 6–12 in. high and about ½ in. thick. Leaves linear-lanceolate, reaching 6 in. long. Flowers nearly 3 in. in diam., pale buff with maroon-purple blotches at the base of the lip. Lip with a broad claw and broadly obovate blade. Fl. B. I. v. 5, p. 722; Bot. Mag. t. 5130; Veitch, Man. Orchid. Pl. part 3 (1888) p. 16; Woodr. Gard. in Ind. ed. 5, p. 473.

Dendrobium cretaceum, Lindl. in Bot. Reg. (1847) t. 62. A native of Assam and the Khasia Hills. Stems stoutish, 9–12 in. long, curved. Leaves 2–3 in. long, oblong-lanceolate, deciduous. Flowers 1½ in. in diam., cream-white. Lip elliptic-oblong, fimbriate-dentate; disk yellowish, streaked with crimson. Fl. B. I. v. 5, p. 736; Bot. Mag. t. 4686; Veitch, Man. Orchid. Pl. part 3 (1888) p. 33; Woodr. Gard. in Ind. ed. 5, p. 474.

Dendrobium heterocarpum, Wall. in Lindl. Gen. & Sp. Orchid. (1830) p. 78. A native of Nepal, Assam, Birma, Ceylon, Java, and the Philippines. Stems erect, stoutish, 9–18 in. high, yellow. Leaves 4–5 in. long, oblong-lanceolate, acute, deciduous. Flowers with a primrose fragrance, 2–2½ in. across. Sepals and petals cream-colored. Lip buff-yellow streaked with reddish-purple; disk velvety. Fl. B. I. v. 5, p. 737; Trim. Fl. Ceyl. v. 4, p. 154. *Dendrobium aureum*, Lindl. Gen. & Sp. Orchid. (1830) p. 77; Bot. Reg. (1839) t. 20; Veitch, Man. Orchid. Pl. part 3 (1888) p. 19; Woodr. Gard. in Ind. ed. 5, p. 473.

Dendrobium Pierardi, Roxb. Hort. Beng. (1814) p. 63. A native of Sikkim and Bengal, where it is common in the Sundribans. Stems slender, pendulous, 2–3 ft. long. Leaves ovate-lanceolate, the lowermost 4–5 in. long, gradually smaller upwards, deciduous. Flowers 1–2 in. across, usually in pairs. Sepals and petals pale rosy-mauve. Lip broadly deltoid, primrose-yellow, streaked with purple at the base. Fl. B. I. v. 5, p. 738; Bot. Mag. t. 2584; Veitch, Man. Orchid. Pl. part 3 (1888) p. 69; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518, & Gard. in Ind. ed. 5, p. 475; Prain, Beng. Pl. p. 1007. *Cymbidium aphyllum*, Sw. in Nov. Act. Soc. Sc. Upsal. v. 6 (1799) p. 73; Grah. Cat. p. 203.

Dendrobium nobile, Lindl. Gen. & Sp. Orchid. (1830) p. 79. A native of the Eastern Himalayas, the Khasia Mountains, and China. Stems tufted, 12–20 in. or more long. Leaves 3–4 in. long, ovate-lanceolate, obliquely emarginate. Flowers 2½–3 in. across, variable in color, odorous. Several varieties of this plant have been described. Fl. B. I. v. 5, p. 740; Bot. Reg. (1844) Misc. p. 48; Veitch, Man. Orchid. Pl. part 3 (1888) p. 63; Woodr. Gard. in Ind. ed. 5, p. 474.

Dendrobium Parishii, Reichb. f. in Bot. Zeit. (1863) p. 237. A native of Upper Birma and Tenasserim. Stems thick, 1 ft. or more long. Leaves 3–5 in. long, oblong-lanceolate, deciduous. Flowers usually rose-purple, 1½–2 in. in diam. Lip with 2 maroon blotches. Fl. B. I. v. 5, p. 740; Bot. Mag. t. 5488; Veitch, Man. Orchid. Pl. part 3 (1888) p. 68; Woodr. Gard. in Ind. ed. 5, p. 475.

Dendrobium aqueum, Lindl. in Bot. Reg. (1843) t. 54. A native of the Nilghiris. Stems 12–20 in. long, decumbent, stoutish, yellowish-green when young. Leaves 3–5 in. long, ovate-oblong, acute. Flowers solitary or in pairs, cream-white except a yellowish disk on the lip. Lip subrhomboid, obscurely 3-lobed. Fl. B. I. v. 5, p. 739; Bot. Mag. t. 4640. *Dendrobium album*, Wight, Icon. t. 1645; Veitch, Man. Orchid. Pl. part 3 (1888) p. 18; Woodr. Gard. in Ind. ed. 5, p. 473.

Dendrobium Dalhousieanum, Wall. MSS. in Paxt. Mag. v. 11 (1844) p. 145. A native of Sikkim, Assam, and Birma. Stems 3–4 ft. long, spotted with purple when young. Leaves 4–6 in. long, ovate-lanceolate, deciduous. Flowers 4–5 in. across, pale-yellow, veined and tinted with rose. Lip elliptic, concave, obscurely 3-lobed, with a large maroon-purple blotch on each side near the base. Fl. B. I. v. 5, p. 743; Veitch, Man. Orchid. Pl. part 3 (1888) p. 35; Woodr. Gard. in Ind. ed. 5, p. 474.

Dendrobium aggregatum, Roxb. Fl. Ind. v. 3 (1832) p. 477. A native of Assam, Birma, and China. Pseudobulbs clustered, reaching 2 in. long, 1-leaved. Flowers 1½ in. in diam., primrose-yellow when first expanded, changing in age to orange-yellow with a deeper color on the lip. Lip transversely oblong, with a short claw and pubescent disk. Fl. B. I. v. 5, p. 749; Bot. Mag. t. 3643; Veitch, Man. Orchid. Pl. part 3 (1888) p. 15; Woodr. Gard. in Ind. ed. 5, p. 472.

Dendrobium Farmeri, Paxt. Mag. v. 15 (1849) p. 241. A native of the tropical Eastern Himalayas, Assam, and Birma. Stems 10–18 in. long, clavate, 4-angled. Leaves 2–4, near the summit of the stems, 6 in. long, elliptic-oblong, persistent. Flowers 2 in. across, pale straw-yellow tinted with rose. Lip suborbicular; disk deep yellow. Fl. B. I. v. 5, p. 750; Bot. Mag. t. 4659; Veitch, Man. Orchid. Pl. part 3 (1888) p. 41; Woodr. Gard. in Ind. ed. 5, p. 474.

5. CIRRHOPETALUM, Lindl.

Epiphytic herbs with usually a creeping rhizome but sometimes tufted. Pseudobulbs 1 (rarely 2) -leaved. Leaves when solitary usually coriaceous and persistent, when geminate usually membranous and deciduous. Flowers in whorled umbels (in the Bombay species) on scapes rising from

the base of a pseudobulb. Lateral sepals usually much elongated and acuminate, oblique, often connate by their inner edges, their bases adnate to the sides of the column or its foot; dorsal sepals short, concave, rarely half as long as the lateral, usually much shorter. Petals shorter than the dorsal sepal. Lip small, tumid, usually entire, always shorter than the dorsal sepal, jointed to the end of the foot of the column and more or less mobile. Column short with 2 (rarely 4) tooth-like appendages at the apex, the foot more or less produced. Anther 2-celled; pollinia 4, waxy, cohering in one mass and sometimes attached by their lower ends to a mass of viscid tissue, the 2 inner usually small and lamelliform.—DISTRIB. Species about 50, chiefly Indian and Malayan.

1. **Cirrhopetalum fimbriatum,** *Lindl. in Bot. Reg.* (1839) *Misc.* p. 72. Pseudobulbs clustered, ovoid, irregularly angular, smooth and polished, yellow and leafless when flowering, reaching 1 in. long. Leaves (from a specimen grown at Kew) 3–4 by $\frac{1}{2}$–$\frac{5}{8}$ in., oblong-lanceolate, acute. Scape from below the pseudobulbs, 4–8 in. long, slender, smooth, terete, with 2 or 3 lanceolate acute bract-like scales; flowers in umbels, nearly sessile, numerous; bracts $\frac{1}{6}$ in. long, lanceolate, acutely acuminate. Sepals green; lateral sepals 1–1$\frac{1}{4}$ in. long, linear, acute, flat, cohering by their inner edges to near the tip, 5-nerved; dorsal sepal reaching $\frac{1}{4}$ in. long, ovate, suddenly tapering at the apex into a long subulate tail, 3-nerved. Petals $\frac{1}{8}$ in. long, ovate, caudate, fringed with purple cilia, 1-nerved. Lip reddish-brown, fleshy, somewhat tongue-shaped, $\frac{1}{8}$ in. long. Column with 2 subulate horizontal horns. Fl. B. I. v. 5, p. 774; Dalz. & Gibs. p. 261; Bot. Mag. t. 4391; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 34. *Cirrhopetalum Wallichii*, Grah. Cat. p. 205 (*not* of Lindl.).—Flowers: Apr.–May.

KONKAN: *Stocks*!, *Law*!, *Gammie*. DECCAN: Párghát below Mahableshwar, *Law*!, *Graham*; Rotunda Ghát, Mahableshwar, *Graham*; Koina Valley below Mahableshwar, *Cooke*!, *Woodrow*; Mahableshwar, *H. M. Birdwood*. S. M. COUNTRY: Párva Ghát, *Dalzell & Gibson*. KANARA: *Law*!, *Gammie*; Supa Ghâts of N. Kanara, *Talbot*, 65! This orchid is known to Anglo-Indians as the *Umbrella Orchis*.—DISTRIB. India (W. Peninsula), apparently endemic.

6. **BULBOPHYLLUM,** Thouars.

Epiphytic herbs. Pseudobulbs from a creeping rhizome (rarely 0), 1 (rarely 2) -leaved. Flowers on scapes from the rhizome usually close to the pseudobulbs, racemose, spicate, capitate, umbellate or solitary. Sepals subequal or the lateral rather longer than the dorsal and free or connate under the lip. Petals usually smaller than the dorsal sepal. Lip articulate with the foot of the column, mobile, small, usually much recurved. Column very short, often 2-aristate at the apex. Anther 2-celled; pollinia 4, free, the 2 inner smaller (rarely obsolete).—DISTRIB. Species nearly 300, chiefly Asiatic, a few African, American, and Australian.

1. **Bulbophyllum neilgherrense,** *Wight, Icon.* v. 5, part 1 (1852) p. 6, t. 1650. Rhizome creeping. Pseudobulbs ovoid, 1$\frac{1}{2}$–2 in. long, irregularly angled. Leaf 1 from the top of the pseudobulb, 3$\frac{1}{2}$–5$\frac{1}{2}$ by 1–1$\frac{1}{2}$ in., oblong, obtuse, often slightly emarginate, tapering at the base,

strongly many-nerved. Scape stout, from the base of the pseudobulb, sheathed at the base, jointed and with bract-like sheaths at the joints. Flowers in many-flowered racemes reaching with the scape sometimes 7 in. long; bracts $\frac{1}{4}$ in. long, lanceolate, acute; pedicel with ovary about as long as the bract when in flower. Sepals dull brownish-yellow, suffused with red at their bases; lateral sepals $\frac{3}{8}$ in. long, ovate-lanceolate, acute, oblique; dorsal sepal $\frac{1}{4}$ by $\frac{1}{6}$ in., broadly ovate, acute. Petals smaller than the dorsal sepal, ovate, acuminate, pale yellow. Lip 3-lobed, recurved; side lobes small, purple, entire or toothed; midlobe tongue-shaped, obtuse, brownish-yellow. Column with lanceolate spurs. Fl. B. I. v. 5, p. 761; Bot. Mag. t. 5050; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 33.—Flowers: Dec.

Not very common. S. M. Country: Belgaum Ghâts, *Gammie*. Kanara: N. Kanara Ghâts, *Gammie*; Sampkhand, *Woodrow*.—Distrib. India (W. Peninsula).

7. **TRIAS,** Lindl.

Small epiphytic pseudobulbous herbs. Leaves solitary on the pseudobulbs, coriaceous. Flowers solitary on lateral scapes. Sepals subequal, spreading, 7-nerved; lateral adnate to the foot of the column. Petals small, oblong or linear. Lip small, coriaceous or fleshy, jointed to the foot of the column, inflexed, incumbent, mobile. Column short, broad, the tip winged or toothed or angled. Anther erect, caducous, 2-celled, produced into a long horn; pollinia 4, waxy, subcoherent in pairs in each cell.—Distrib. Species 3 or 4, all Indian.

1. **Trias Stocksii,** *Hook. f. Fl. B. I.* v. 5 (1890) p. 781. A small epiphyte. Rhizome creeping. Pseudobulbs globosely ovoid, $\frac{3}{8}$–$\frac{3}{4}$ in. in diam. Leaves $\frac{3}{4}$–$1\frac{1}{4}$ by $\frac{3}{8}$–$\frac{1}{2}$ in., elliptic-oblong, usually acute, sometimes apiculate, tapering at the base. Scape $\frac{1}{2}$ in. long. Flowers large for the size of the plant, $\frac{1}{2}$–$\frac{2}{3}$ in. in diam. Lateral sepals $\frac{1}{4}$ by $\frac{1}{5}$ in., oblong, obtuse; dorsal sepal $\frac{1}{5}$ by $\frac{1}{6}$ in., oblong, obtuse. Petals small, linear-lanceolate, acute, erect. Lip oblong, smooth, the shoulders convex, the tip rounded. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518 Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 34.

Rare. Konkan: *Law*! Kanara; *Stocks*, 69!—Distrib. India (W. Peninsula).

8. **PHOLIDOTA,** Lindl.

Epiphytic herbs with jointed often branching stems, with internodes like pseudobulbs, or with tufted pseudobulbs. Leaves usually in pairs (solitary in *P. imbricata*, the only Bombay species), membranous, many-nerved. Flowers small, subglobose, expanding from above downwards, in racemes which are terminal or from the base of a pseudobulb, usually drooping and distichous; peduncles ebracteate; floral bracts large and persistent. Sepals concave. Petals narrower than the sepals. Lip more or less cymbiform and saccate, usually without side lobes. Column short, the apex shortly hooded or winged; anther more or less globose: pollinia 4, waxy, subglobose or clavate, cohering by pairs to one or two membranes.—Distrib. India, Ceylon, China, Malay Peninsula, Australia; species about 20.

1. **Pholidota imbricata,** *Lindl. in Hook. Fl. Exot.* (1825) t. 138. A pendent epiphyte; pseudobulbs cæspitose, cylindric, thickened at the base, 2-3 in. long and $\frac{1}{2}$–$\frac{3}{4}$ in. thick at the middle, or shorter and more ovoid, furrowed, more or less enveloped in large fibrous sheaths. Leaf solitary, 6–12 by $1\frac{1}{4}$–$2\frac{1}{4}$ in., elliptic-lanceolate or oblanceolate, acute, strongly 3–5-nerved, tapering at the base into a stout petiole $1\frac{1}{2}$ in. long. Flowers in dense many-flowered drooping racemes 6–9 in. long, rising from the top of the pseudobulb, distichous, $\frac{1}{4}$ in. long, white with a pinkish or yellowish tinge (*Trimen*); peduncles slender, naked, as long as or longer than the raceme; floral bracts large, longer than the slender stalked ovary, persistent, pale brown, convolute, $\frac{1}{3}$ in. broad, subrotund, minutely apiculate, many-nerved, the edges irregularly folded. Sepals $\frac{1}{4}$ in. long; lateral sepals connate at the base, cymbiform with a winged keel; dorsal sepal orbicular, 3-nerved. Petals linear-oblong, subacute. Lip 3-lobed, saccate between the side lobes; side lobes large, broad, rounded; midlobe divided at the apex into 2 small oblong lobules separated by a broad sinus. Column broad and winged in its upper half; pollinia clavate, attached by pairs to two small membranes. Capsules $\frac{3}{4}$ in. long, ellipsoid, strongly ribbed, the fruiting rhachis thickened. Fl. B. I. v. 5, p. 845; Dalz. & Gibs. p. 262; Wight, Icon. t. 907; Lindl. Bot. Reg. tt. 1213, 1777; Trim. Fl. Ceyl. v. 4, p. 162; King & Pantl. Ann. Roy. Bot. Gard. Calc. v. 8, p. 144, t. 201; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Prain. Beng. Pl. p. 1012.—Flowers: July.

KONKAN: *Stocks!, Law!*; S. Konkan, *Dalzell*, 51!; near Vingorla rare, *Dalzell & Gibson*. KANARA: N. Kanara, *Woodrow*.—DISTRIB. India (Sikkim, Kumaon, Bhutan, Assam, Chittagong, Birma, Andaman Islands, W. Peninsula); Ceylon, Malay Peninsula, China, Philippines.

9. **JOSEPHIA**, Wight.

Epiphytic almost stemless tufted herbs; root-fibres very stout. Leaves radical, petiolate, coriaceous, elliptic or oblong. Flowers small, pedicellate, in slender secundly branched panicles terminal or subterminal on the branches; bracts persistent, small. Sepals connivent, subequal, oblong, obtuse, concave, with a subsaccate base. Petals as long as the sepals, oblong, obtuse. Lip adnate to the base of the column, erect, fleshy, concave; side lobes short, rounded, incurved; midlobe small, rounded; disk with a broad callus uniting the side lobes. Column erect, nearly as long as the sepals, broad above, footless. Anther acuminate, 2-celled; pollinia 4, oblong, parallel, subcaudate, attached by a viscus to a broad gland.—DISTRIB. East Indies; species 2.

Wight says on the authority of Jerdon, who had the plants in cultivation for 3 years, that the flowers in the genus are annually renewed on the old scapes.

1. **Josephia lanceolata,** *Wight, Icon.* v. 5, part 1 (1852) p. 19, t. 1742 (leaves only; for flowers see t. 1743). Leaves including petioles 3–$5\frac{1}{2}$ by $\frac{1}{2}$–1 in., oblong or oblong-lanceolate or oblanceolate, obtuse or subacute, apiculate, very coriaceous, dull green, strongly nerved, contracted at the base into a channelled petiole $\frac{1}{2}$–2 in. long. Inflorescence very like that of a *Statice*; scapes exceeding the leaves, sometimes reaching 12 in. long; flowers white, tinged with purple; bracts small, ovate, acute, persistent; pedicel with the ovary short. Sepals $\frac{1}{5}$–$\frac{1}{10}$ in.

long, obtuse, 3-nerved. Petals linear-oblong, obtuse, 1-nerved. Lip fleshy; side lobes small, rounded; midlobe subquadrate, rounded, somewhat saccate between the side lobes. Column purple. Fl. B. I. v. 5, p. 823; Trim. Fl. Ceyl. v. 4, p. 182; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518.

KANARA: *Stocks*, 50!, *Law*!

Wight's draftsman has transposed the figures of the inflorescence in the 'Icones,' giving the inflorescence of *Josephia lanceolata* to *Josephia latifolia*.

10. **PORPAX**, Lindl.

Small epiphytes with much depressed subdiscoid pseudobulbs clothed with reticulate sheaths. Leaves 2, membranous, caducous. Flowers 1–3, subsessile on the top of the pseudobulbs. Sepals connivent at the base, often all connate into a tube or the lateral only connate; lateral pair oblique at the base and adnate to the long-produced foot of the column. Petals small, free, usually shorter than the sepals. Lip sessile on the foot of the column and incumbent. Column short, wingless, its foot very long. Pollinia normally 8, pyriform or obovoid, attached by fours to a very short granular membrane.—DISTRIB. Species 6, all East Indian.

This genus, founded by Lindley in 1845 (Bot. Reg. Misc. p. 62), has been included under *Eria* by Bentham & Hooker f. [Gen. Pl. v. 3 (1883) p. 509], but has been again separated by King & Pantling [Orchids of the Sikkim Himalaya in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 113].

Flowers dark purple, campanulate; leaves oblong; sepals connate almost throughout their entire length into a tube ..... 1. *P. reticulata.*
Flowers yellow, 2-lipped; leaves suborbicular; lateral sepals connate at the base; dorsal sepal free or nearly so ..... 2. *P. Lichenora.*

1. **Porpax reticulata,** *Lindl. in Bot. Reg.* v. 31 (1845) *Misc.* p. 62. Pseudobulbs button-like, $\frac{3}{4}$ in. in diam., covered with lace-like sheaths. Leaves less than 1 in. long, broadly oblong. Flowers solitary, reaching $\frac{1}{2}$ in. or more long, purple-brown, rising from between the leaves with sheaths and an orbicular bract at the base. Sepals all connate in a subcampanulate 3-lobed tube, strongly nerved on the inside; lobes broadly ovate, acute. Petals included in a sepaline tube, $\frac{1}{3}$ by $\frac{1}{16}$–$\frac{1}{10}$ in., spathulate, strongly 5-nerved. Mentum (*spur*) obscure. Lip $\frac{1}{6}$ in. long, panduriform, crenulate, shortly clawed, furnished at the base with an erect subulate tooth-like process. Pollinia 8, pyriform. Fruit not seen. *Eria reticulata*, Benth. in Gen. Pl. v. 3 (1883) p. 509; Hook. f. Fl. B. I. v. 5, p. 786; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 35. *Aggeianthus marchantioides*, Wight, Icon. v. 5, part 1 (1852) p. 18, t. 1737.—Flowers: June–July.

Thoughout the Western Ghâts, but not easy to discover as the pseudobulbs are small and resemble the bark on which they rest. KANARA: Chandwâr, *Ritchie*, 1415!

2. **Porpax Lichenora,** *T. Cooke.* Pseudobulbs depressed, disk-like, $\frac{1}{2}$–$\frac{3}{4}$ in. in diam., crowded, covered with a fibrous network. Leaves 2 on each pseudobulb, $\frac{1}{2}$–$1\frac{1}{4}$ in. long, broadly ovate or orbicular, ciliate, brownish beautifully tessellated with green (*Gammie*). Flowers $\frac{1}{3}$ in. long, yellowish, 2-lipped; pedicels very short with a broad ciliate bract

and many subsimilar sheaths. Lateral sepals connate, pubescent, concave; dorsal sepal orbicular-ovate, 5-nerved (? free or connate with the lateral ones). Mentum (*spur*) small, rounded. Petals linear-spathulate, much shorter than the sepals. Lip very small, shortly clawed, ovate-cordate, with toothed sides and an acute tip. *Eria Lichenora*, Lindl. in Journ. Linn. Soc. v. 3 (1858) p. 46; Hook. f. Fl. B. I. v. 5, p. 787; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 35. *Lichenora Jerdoniana*, Wight, Icon. v. 5, part 1 (1852) p. 18, t. 1738 (figure not good).—Flowers: July.

KONKAN: *Stocks!*, *Law!* S. M. COUNTRY: Belgaum Ghâts, *Spooner* ex *Gammie*. KANARA: *Spooner* ex *Gammie*; Sampkhand, *Woodrow*.—DISTRIB. India (W. Peninsula).

The plant requires the examination of *fresh* specimens. There is but one sheet in Herb. Kew., the specimens on which are imperfect. Wight says in his description (Icon. *l. c.*) that the sepals are adherent at the base, but this is not shown in his drawing, which is not good, his material, as he has explained, having been limited.

11. **ERIA,** Lindl.

Epiphytic usually pseudobulbous herbs; pseudobulbs often elongate and stem-like. Flowers never large, rarely showy, often pubescent or tomentose, in racemes, spikes, or heads on 1–2-flowered peduncles. Sepals free, adnate to the elongate foot of the column and forming with it a short or long and spur-like or saccate mentum. Petals like the sepals. Lip sessile on the foot of the column and incumbent. Column short and straight or long and little curved. Anther imperfectly 4- or 8-celled; pollinia waxy, pyriform or broadly obovoid, attached in fours by their bases to a granular membrane or occasionally all attached to a single viscus.—DISTRIB. Tropical Asia; species more than 100.

Flowers solitary on slender scapes	1. *E. reticosa.*
Flowers in racemes.	
Small plants less than 4 in. high; leaves less than 3 in. long; sepals and petals greenish-yellow.	
Margins of sepals entire; lip ovate-lanceolate	2. *E. Dalzellii.*
Margins of sepals ciliate with minute gland-tipped hairs; lip pandurate	3. *E. microchilos.*
Plant exceeding 4 in. high; leaves 4–8 in. long; sepals and petals white	4. *E. mysorensis.*

1. **Eria reticosa,** *Wight, Icon.* v. 5 (1852) p. 4, t. 1637. Cæspitose, stemless; pseudobulbs ½–¾ in. in diam., enclosed in a net-like sac, depressed-globose. Leaves 2, oblong-lanceolate or elliptic-lanceolate, acute, 1–3 by ⅜–⅞ in. Flowers solitary, large for the size of the plant, on slender scapes 1–1¾ in. long; bract below the flower large, ⅓ in. long and nearly as broad, ovate, acute, cordate, strongly nerved. Sepals pure white; lateral sepals reaching ⅞ in. long by ⅜ in. broad at the base, falcate, acute, 7-nerved; dorsal sepal nearly 1 in. long by ¼ in. broad, oblong-lanceolate, acute, 5-nerved. Mentum short, broad, sac-like. Petals white, as long as the lateral sepals, ¼ in. broad, oblong-lanceolate, acute, 5-nerved. Lip ¾ in. long, 3-lobed; side lobes long, narrow, rounded, white edged with a purple line (*Ritchie*); midlobe ¼–⅜ in. long, ovate, acute, yellow at base and white towards the tip (*Gammie*), the margins subcrenulate; disk with 2 crested ridges. Column very short, yellow.

Capsules ½ in. long, obovoid, conspicuously and deeply ribbed. Fl. B. I. v. 5, p. 787; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 36. *Eria braccata*, Dalz. & Gibs. Bo. Fl. p. 262 (*not* of Lindl.). *Eria uniflora*, Dalz. in Kew Journ. Bot. v. 4 (1852) p. 111.—Flowers: July.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!, *Woodrow*; Western Ghâts, *Gammie*. DECCAN: Mahableshwar, *Dalzell*!, *H. M. Birdwood*; Lanoli, very common, *Gammie*. S. M. COUNTRY: Râmghât, *Ritchie*, 707!—DISTRIB. India (W. Peninsula).

2. **Eria Dalzellii,** *Lindl. in Journ. Linn. Soc.* v. 3 (1858) p. 47. A small plant 1½–3 in. high (rarely more). Pseudobulbs flattened, ovoid, reaching ½ in. in diam., reticulated; principal venation pinnate (*Gammie*). Leaves usually 2, oblanceolate-oblong, obtuse. Flowers in racemes from between the leaves, secund, green with a yellow tinge; pedicels short; bract below the flower ⅛ in. long, lanceolate with a long acumen. Sepals lanceolate, acute, often recurved towards the apex; lateral sepals ⅕ in. long; dorsal sepal ¼ in. long. Mentum (*spur*) broad, short, blunt, sac-like. Petals as long as the lateral sepals, lanceolate, acute. Lip $\frac{1}{10}$ by $\frac{1}{25}$ in., rather thick, ovate-lanceolate, with 2 distinct callosities at the base; side lobes narrow, rounded, ½ the length of the lip; midlobe $\frac{1}{20}$ in. long, linear, acute, with a crenulate margin. Column nearly white (*Gammie*). Anther imperfectly 8-celled; pollinia 8, pyriform. Fl. B. I. v. 5, p. 789; Dalz. & Gibs. p. 262; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 36. *Dendrobium filiforme*, Wight, Icon. v. 5, part 1 (1852) p. 5, t. 1642.—Flowers: July.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!, *Gammie*; S. Konkan and Ghâts, *Dalzell & Gibson*.—DISTRIB. India (W. Peninsula).

There is a marked difference between the lip of this orchid and the lip of *Eria microchilos*, Lindl., which it otherwise much resembles. The points of difference between the two plants have been clearly pointed out by Gammie (Journ. Bomb. Nat. *l.c.*). I have examined Lindley's own specimens in his Herbarium.

3. **Eria microchilos,** *Lindl. in Journ. Linn. Soc.* v. 3 (1858) p. 47. Pseudobulbs flattened, irregularly shaped, ½ in. in diam., reticulated; principal venation flabellate (*Gammie*). Leaves 2–4, oblong-lanceolate, obtuse, reaching 2 in. long. Flowers secund, in racemes rising from the base of the leaves; bracts $\frac{1}{10}$ in. long, ovate-lanceolate, acute. Sepals minutely ciliate with gland-tipped hairs; lateral sepals ⅛ in. long, broadly lanceolate, acute; dorsal sepal ⅛ in. long, linear-lanceolate. Mentum (*spur*) $\frac{1}{12}$ in. long, curved forward. Petals ⅙ by $\frac{1}{20}$ in., more or less ciliate with minute gland-tipped hairs. Lip $\frac{1}{10}$–⅛ in. long, thin, pandurate; side lobes small, rounded; midlobe broadly ovate, rounded and with subcrenulate margins; disk with almost obsolete ridges which coalesce in a single line towards the apex. Column green (*Gammie*); pollinia 8, pyriform, unequal. Dalz. & Gibs. p. 262; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 36. *Eria Dalzellii* var. *fimbriata*, Hook. f. Fl. B. I. v. 5, p. 789. *Dendrobium microchilos*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 345.—Flowers: July–Aug.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!, *Gammie*; Wari country on mango-trees, *Dalzell & Gibson*. DECCAN: Mahableshwar, common, *Cooke*!—DISTRIB. India (W. Peninsula).

The difference between the lip of this orchid and that of *Eria Dalzellii* is sufficient to justify its restoration to the rank of a species which is given to it by Lindley.

4. **Eria mysorensis,** *Lindl. in Journ. Linn. Soc.* v. 3 (1858) p. 54. Pseudobulbs ovoid, 2–3 in. long. Leaves 4–5, membranous, 4–8 by ¾–1¼ in., elliptic-lanceolate or oblong-lanceolate, acute, strongly and closely parallel-nerved. Flowers 6–12, in glabrous curved racemes which are shorter than the leaves, usually 2 racemes on each pseudobulb; pedicels ¼–½ in. long, filiform; bracts ½–⅝ in. long, ovate-lanceolate, acute, glabrous, reflexed. Sepals white, strongly nerved; lateral sepals ½ in. long by ⅛ in. broad at the base, falcate, acute; dorsal sepal ½ by ⅒ in., linear-lanceolate, acute. Mentum (*spur*) very small, obtuse, sac-like. Petals white, rather shorter than the dorsal sepal, 1/16 in. broad, lanceolate, acute, strongly 3-nerved. Lip ⅓ by ⅒ in., oblong or subpandurate, with a short claw, subcordate at the base; side lobes narrow, rounded, purple (*Gammie*); midlobe about ⅕ in. long, yellow (*Gammie*), apiculate, the side nerves usually forming arched thickened ridges. Fl. B. I. v. 5, p. 793; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518; Gammie, in Journ. Bomb. Nat. v. 17, part 1 (1906) p. 37.—Flowers: July.

KONKAN: *Stocks!*; Western Ghâts, *Gammie.* DECCAN: Koina Valley below Mahableshwar, *Cooke!*, *Woodrow*, *H. M. Birdwood*; Mahableshwar, *Gammie.* S. M. COUNTRY: Dharwar, *Law!*—DISTRIB. India (W. Peninsula).

12. **THUNIA,** Reichb.

Terrestrial or epiphytic herbs; stems slender or equally thickened along their entire length, elongate, leafy, with numerous foliaceous sheaths below. Leaves distichous, lanceolate, glaucous. Flowers in terminal drooping racemes; bracts large, scarious. Sepals erecto-patent, subequal, lanceolate, acute. Petals like the sepals. Lip adnate to the base of the footless column, shortly spurred; side lobes short, involving the column; midlobe fringed. Anther narrow, pendulous, incompletely 4-celled; pollinia 8, waxy, attached in fours to a granular membrane; rostellum 3-lobed.—DISTRIB. Species 5 or 6, East Indian.

1. **Thunia venosa,** *Rolfe, in Orchid. Rev.* v. 13 (1905) p. 206. Epiphytic. Flowers in terminal congested racemes. There is one specimen of this orchid from the Bombay Presidency in Herb. Kew. collected by Dalzell in 1869 on the east side of Matheran Hill and which Dalzell described as a new *Dendrobium.* I subjoin Dalzell's description *literatim* from his manuscript in Herb. Kew.:—

"Stem 1–1½ ft. high. Leaves sheathing, alternate, bifarious, their sheaths entire, 1 in. long; leaves gradually larger upwards, 3–7 in. long. Flowers terminal, 3–4, each subtended by a pale green foliaceous persistent bract nearly 2 inches in length. Sepals and petals alike, pure white, linear-lanceolate, acute, erect in flowering and spreading like a fan, all on one side and furthest from the axis, the lip being inner and opposed. Labellum ½ in., shorter than the sepals and petals, somewhat trumpet-shaped, the lower parts of the margin meeting. Throat of the labellum with 5 parallel rugged ridges; edges of labellum lacerato-fimbriate, the inside painted throughout with veins of a carmine colour. Spur half the length of the ovary, decidedly short, cylindrical. Column rather long, expanded upwards into wings, semicucullate above, white, shaped like the hood of a cobra. *Lip not articulated with the spur, which merely forms the tubular base of the labellum.* Flowers in the

rainy season (August). Very unlike *Dendrobium chlorops* and *D. barbatulum* in habit, as the leaves and flowers of this plant appear together, but in the cold and hot seasons it is scarcely distinguishable from them except by the somewhat larger fruit. Appears to come nearest in habit and appearance to *D. formosum*, Roxb., figured in Wall. Pl. As. Rar. t. 39. This is by far the handsomest orchid in the Bombay Presidency." *Phajus albus*, Bot. Reg. (1838) t. 33 (*not* of Lindl.); Bot. Mag. t. 3991; Grah. Cat. p. 205; Hook. f. Fl. B. I. v. 5, p. 818 in part; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 518.—Flowers: July–Aug.

Rare. KONKAN: Matheran Hill eastern side, *Dalzell*! DECCAN: on trees at Khandala, *Graham*; Mahableshwar, *Fairbank* ex *H. M. Birdwood*; Lanoli, *Woodrow*.

King and Pantling (Ann. Roy. Bot. Gard. Calc. v. 8, p. 111) mention, as occurring in Sikkim, a small and epiphytal form of *Phajus albus* with a shorter congested raceme and not ascending beyond 3000 ft., which would seem to be this.—DISTRIB. India (Kumaon, Sikkim, Assam, Khasia, Mussoorie, Birma, W. Peninsula).

13. **EULOPHIA,** R. Br.

Terrestrial glabrous herbs with fleshy tubers or rhizomes (rarely pseudobulbous). Leaves appearing with or after the flowers, long, narrow, usually plicate. Flowers racemose, rarely paniculate, on a tall erect sheathed usually lateral scape. Sepals free, spreading, subequal. Petals subsimilar. Lip adnate to the base of the column or to its foot, base saccate or with a short spur; side lobes erect and embracing the column (rarely 0); midlobe spreading or recurved; disk usually ridged or crested. Column with or without a foot, its apex entire and often oblique, the margins sometimes winged or lobed; anther terminal, sometimes with 2 apical processes, 2-celled; pollinia 2, globose, attached by a caudicle to the flat gland of the rostellum.—DISTRIB. Tropical, numerous in Africa; species about 50.

Column not produced into a foot.
- Lip longer than broad; side lobes of lip short or 0; disk of lip with many fringed nerves.
  - Sepals ½ in. long; side lobes of lip 0 ..... 1. *E. ochreata.*
  - Sepals ⅝–1¼ in. long; side lobes of lip ⅛ in. long ..... 2. *E. herbacea.*
- Lip broader than long; disk of lip with 3 crested nerves ..... 3. *E. pratensis.*

Column produced into a foot ..... 4. *E. nuda.*

1. **Eulophia ochreata,** *Lindl. in Journ. Linn. Soc.* v. 3 (1858) p. 24. Roots tuberous, hypogeal. Leaves 3–5, elliptic-lanceolate, acuminate, 4–12 by 1½–2½ in., many-nerved, sessile. Flowers membranous in all their parts, in dense many-flowered cylindric racemes 4–6 in. long; scape 8–12 in. long, stout below, furnished with broad loose ochreate sheaths; bracts beneath the flowers ½–½ in. long, conspicuous, narrow, linear-lanceolate, acute; pedicels with ovary ½ in. long. Sepals ½ in. long, linear-lanceolate, acute, strongly nerved. Petals ⅜ in. long, broadly elliptic, acute, strongly nerved. Spur a small hemispheric sac. Lip ⅜ in. long, broadly ovate, obtuse; side lobes 0; nerves all fringed. Fl. B. I. v. 6, p. 2; Dalz. & Gibs. p. 265.

KONKAN: *Stocks*!, *Law*!, *Dalzell & Gibson*. S. M. COUNTRY: Dharwar, *Law*! KANARA: *Law*!—DISTRIB. India (W. Peninsula), apparently endemic.

2. **Eulophia herbacea,** *Lindl. Gen. & Sp. Orchid.* (1833) p. 182. Stem 4–6 in. long, sheathed. Leaves 6–12 in. long, varying in breadth from 1–3½ in., linear-lanceolate or elliptic lanceolate, many-nerved.

Flowers large, in rather lax racemes; scape stout, 2–3 ft. high, with large acuminate sheaths; bracts beneath the pedicels reaching $1\frac{3}{4}$ in. long, linear-lanceolate, acuminate; pedicels with ovary $\frac{3}{4}$–1 in. long. Sepals green, $\frac{7}{8}$–$1\frac{1}{4}$ by $\frac{1}{6}$ in., linear-lanceolate. Mentum (*spur*) $\frac{1}{6}$ in. long, slender, terete, obtuse. Petals white, $\frac{1}{2}$–$\frac{5}{8}$ by $\frac{1}{4}$–$\frac{3}{8}$ in., oblong-elliptic, obtuse or subacute, with numerous strong branched purple nerves. Lip $\frac{3}{4}$ in. long; side lobes $\frac{1}{5}$ in. long, rounded; midlobe $\frac{3}{8}$–$\frac{1}{2}$ in. long, oblong or obovate-oblong, obtuse, apiculate, white, with many fringed yellow nerves. Column $\frac{1}{4}$ in. high, not produced into a foot. Capsules $1\frac{1}{2}$–$1\frac{3}{4}$ in. long, ellipsoid, faintly ribbed. Fl. B. I. v. 6, p. 2; Dalz. & Gibs. p. 265; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Watt, Dict. Econ. Prod. v. 3, p. 291. *Eulophia bicolor*, Lindl. in Journ. Linn. Soc. v. 3 (1858) p. 24 (*not* of Dalzell). *Eulophia carinata*, Grah. Cat. p. 202 (*not* of Lindl.).—Flowers: July.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!, *Dalzell & Gibson*. KANARA: *Law*! GUJARAT: Panch Mahals near Dohad, *Raoji*!; Khodva, *Raoji*!—DISTRIB. India (W. Himalaya, W. Peninsula).

3. **Eulophia pratensis,** *Lindl. in Journ. Linn. Soc.* v. 3 (1858) p. 25. Leaves appearing after the flowers; hence Lindley and Dalzell describe the plant as leafless. Leaves petiolate, reaching 12 in. long, in breadth varying from $\frac{1}{2}$–$1\frac{1}{2}$ in., oblong-lanceolate, acute, strongly nerved, tapering at the base into a long sheathing petiole. Flowers yellow, in lax racemes; scape 1–3 ft. long, with appressed acute sheaths; bracts beneath the pedicels $\frac{3}{8}$–$\frac{1}{2}$ in. long, ovate-lanceolate, acuminate, membranous; pedicels with ovary $\frac{1}{3}$–$\frac{5}{8}$ in. long. Sepals elliptic-oblong, obtuse, subfleshy, 5-nerved; lateral sepals $\frac{1}{2}$ by $\frac{1}{4}$ in.; dorsal sepal slightly longer and slightly narrower than the lateral ones. Mentum (*spur*) $\frac{1}{8}$ in. long, conical from a broad base, subacute. Petals shorter and broader than the dorsal sepal, elliptic-oblong, obtuse. Lip $\frac{7}{16}$ in. long, $\frac{5}{8}$ in. broad across the side lobes when spread out; side lobes large, $\frac{1}{5}$ in. long, oblong, rounded; midlobe $\frac{1}{8}$ in. long, broadly ovate or suborbicular, obtuse; disk with 3 crested nerves. Capsules $1\frac{1}{4}$ in. long, ellipsoid, turgid. Fl. B. I. v. 6, p. 4; Dalz. & Gibs. p. 264; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Eulophia ramentacea*, Wight, Icon. v. 5, part 1 (1852) p. 8, t. 1666 (*not* of Lindl.). *E. virens*, Grah. Cat. p. 202 (*not* of Brown).—Flowers: Nov.–Feb. VERN. *Satavari.*

DECCAN: *Stocks*, 22!; pasture-lands, *Dalzell & Gibson*; Pashan 6 miles west of Poona, *Tukaram*!; Poona, *Woodrow*, 965!; Panchgani, *A. St. J. Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 1421!—DISTRIB. India (W. Peninsula), apparently endemic.

4. **Eulophia nuda,** *Lindl. in Wall. Cat.* (1828) 7371. Root tuberous, like a small potato, spherical, smooth. Leaves from the sides of the tuber (forming by their sheaths a short pseudo-stem), 10–14 in. long, variable in breadth, elliptic-lanceolate, acute, plicate, narrowed into the long tubular sheath. Flowers 9–20, in lax racemes from the base of the pseudo-stem; scape $1\frac{1}{2}$–2 ft. long, erect, stiff, with a few wide sheaths at the base and some scattered upwards; bracts beneath the flowers $\frac{1}{4}$–$\frac{3}{4}$ in. long, lanceolate, acute; pedicels with ovary $\frac{3}{4}$–$1\frac{1}{4}$ in. long. Sepals greenish-purple, linear-oblong, acute, 7-nerved; lateral sepals $\frac{7}{8}$ by $\frac{1}{5}$ in., inserted on the spur of the lip, slightly falcate; dorsal sepal $\frac{7}{8}$ by $\frac{1}{8}$ in. Mentum (*spur*) very short, conical, obtuse, purplish-green. Petals white, $\frac{5}{8}$ by $\frac{1}{3}$ in., oblong, obtuse, many-nerved.

Lip $\frac{7}{8}$ in. long by $\frac{5}{8}$ in broad across the side lobes, white or yellow flushed with pink or purple; side lobes short, rounded; midlobe $\frac{1}{2}$ in. long, obovate oblong, obtuse, crimped; disk with about 9 strong nerves. Column short with a long foot. Capsules $1\frac{1}{2}$ in. long, fusiform, conspicuously ribbed; pedicels of capsules very short. Fl. B. I. v. 6, p. 5; King & Pantl. in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 180, t. 243; Trim. Fl. Ceyl. v. 4, p. 177; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1016. *Eulophia bicolor*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 343; Dalz. & Gibs. p. 264. *Cyrtoptera fusca*, Wight, Icon. v. 5, part 1 (1852) p. 11, t. 1690.—Flowers: June. VERN. *Ambarkand.*

KONKAN: *Stocks*!, *Dalzell*! S. M. COUNTRY: Rámghát, *Ritchie*, 708!; Londa, *Woodrow*. KANARA: Kála naddi, *Ritchie*, 708!—DISTRIB. India (Chota Nagpur, Assam, Birma, Pegu, Tenasserim, W. Peninsula); Ceylon.

14. **GEODORUM,** Jackson.

Terrestrial herbs with underground subglobose rhizomes. Leaves elliptic, plicate, their sheaths forming a pseudo-stem. Flowers rather crowded, in corymbose racemes decurved at first; bracts narrow, membranous; scape from the base of the pseudo-stem. Sepals equal, oblong, subacute, erect. Petals as long as the sepals but broader and blunt. Lip sessile on the base of the column; side lobes 0; apical lobe broad, rounded, 2-fid or emarginate; disk with a forked basal callus. Column less than half the length of the lip; anther broad, 2-celled; pollinia 2, broadly ovoid, attached by a tapering slender caudicle to a small orbicular gland.—DISTRIB. Species 9 or 10, Indian, Malayan, and Australian.

1. **Geodorum dilatatum,** *R. Br. in Ait. Hort. Kew.* ed. 2, v. 5 (1813) p. 207. Tubers globular, apiculate, $1\frac{1}{4}$ in. in diam. Pseudo-stem 3–6 in. long. Leaves 6–20 by $1\frac{1}{2}$–4 in., elliptic, acute, tapering at the base to a long sheath. Flowers pale purple or rose-colored, in racemes which are short, corymbose, and drooping when in flower, but lengthening and erect in fruit; bract $\frac{1}{2}$ in. long, linear-lanceolate, acute; pedicels with ovary shorter than the bracts. Sepals $\frac{3}{8}$ by $\frac{1}{6}$ in., oblong, acute. Petals $\frac{3}{8}$ by $\frac{1}{6}$ in., oblong, obtuse. Lip pale purple with darker markings, $\frac{3}{8}$ by $\frac{1}{3}$ in., ventricose at the base, subpandurate, without side lobes; the apical lobe broad, rounded, 2-fid or emarginate; disk with a channelled ridge ending in raised yellow calli. Pollinia 2, with elongate pits on their posterior surface. Fl. B. I. v. 6, p. 17; Dalz. & Gibs. p. 266; Prain, Beng. Pl. p. 1017. *Geodorum purpureum*, Hook. f. Fl. B. I. v. 6 (1890) p. 16 in part; Dalz. & Gibs. p. 266; King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 181, t. 245; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Limodorum recurvum*, Roxb. Cor. Pl. v. 1 (1795) t. 39, & Fl. Ind. v. 3 (1832) p. 469. *Malaxis cernua*, Willd. Sp. Pl. v. 4 (1805) p. 93; Grah. Cat. p. 203. *Bela-pola*, Rheede, Hort. Mal. v. 11, p. 69, t. 35.—Flowers: June–July.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!; S. Konkan, *Graham*; Ghâts in S. Konkan, *Stocks*, 42!; Wari country, *Dalzell & Gibson*. KANARA: Kála naddi, *Ritchie*, 1420!—DISTRIB. India (Sikkim, Nepal, Assam, Bengal, Andaman Islands, W. Peninsula); Ceylon.

I have followed Colonel Prain (Beng. Pl. p. 1017) in calling this *G. dilatatum*, Br. (*Limodorum recurvum*, Roxb.). The description given by Brown in Ait. Hort. Kew. of *G purpureum* (*Limodorum nutans*, Roxb.), derived probably from Roxburgh's

description and figure (Cor. Pl. v. 1, t. 40), does not suit. The acute lip shown in Roxburgh's figure, which is otherwise an excellent one, does not agree with the lip of this plant, nor in fact with that of any species of *Geodorum*. In his 'Flora Indica,' v. 3 (1832) p. 469, Roxburgh again describes the lip of *Limodorum nutans* as acute, and cites Rheede (Hort. Mal. v. 11, t. 35), who however in his figure of *Bela-pola* shows the lip as subpandurate, obtuse, and 2-fid at the apex. The lip as figured by Rheede corresponds exactly with the lip of *G. dilatatum*. Dalzell & Gibson (Bomb. Fl. *l.c.*) follow Roxburgh, which shows that Dalzell cannot himself have examined the plant, as his own specimens have the obtuse lip characteristic of the genus. The length of the raceme, as being greater or less than the leaves, is not a character of much importance, for the racemes keep on lengthening after flowering, as pointed out by King & Pantling (*l. c.*). After spending much time over drawings and descriptions, I have come to the conclusion indicated by Sir J. Hooker (Trimen's Fl. Ceyl. v. 4, p. 179) that *G. dilatatum* and *G. purpureum* are both forms of one species, and as Brown's description of *G. dilatatum* fits the plant better than his description of *G. purpureum*, the former name has been adopted.

15. **CYMBIDIUM,** Swartz.

Epiphytes with a short stout pseudo-stem (rarely terrestrial or with an elongated leafy stem). Leaves coriaceous, very long and narrow (rarely elliptic). Flowers in many- or few-flowered erect or drooping racemes from the side of the pseudo-stem; peduncle with numerous sheaths; floral bracts various. Sepals and petals subequal, free, erect or spreading. Lip adnate to the base of the column and embracing it more or less by its convolute side lobes; midlobe decurved, often with undulate edges; disk usually with 2 ridges. Column long, without a foot; anther 1-celled or imperfectly 2-celled; pollinia 2, ovoid, pyriform, cuneiform or globular, more or less partite, sessile on a small or large often strap-shaped gland.—DISTRIB. Tropical or subtropical, on mountains in Asia with a few from Africa and Australia; species about 60.

1. **Cymbidium aloifolium,** *Swartz, in Nov. Act. Upsal.* v. 6 (1799) p. 73. Pseudo-stem short. Leaves 12–18 by $\frac{3}{4}$–$1\frac{1}{8}$ in., linear-oblong, curved, obtuse, fleshy, slightly and obliquely notched at the apex, somewhat sheathing and slightly expanded at the base. Flowers yellowish-red, in many-flowered drooping racemes 9–15 in. long; bracts $\frac{1}{3}$–$\frac{1}{6}$ in. long, ovate, acute; pedicels with ovary $\frac{1}{4}$–$\frac{3}{4}$ in. long. Sepals subequal, oblanceolate-oblong, obtuse; the lateral pair somewhat falcate. Petals as long as the sepals, oblanceolate-ovate, obtuse. Lip purplish, as long as the sepals, oblong, 3-lobed, its upper surface with 2 lamellæ broken and disconnected in the middle; side lobes long, narrow, blunt, entire, their apices pointing forward; midlobe ovate-oblong, much decurved. Column slightly thickened at the apex; anther papillose, subquadrate, the gland of the pollinia small. Capsules 2–2½ in. long, elliptic, ribbed. Fl. B. I. v. 6, p. 10 (*in part*); Lindl. Gen. & Sp. Orchid. (1833) p. 165; Grah. Cat. p. 203; Dalz. & Gibs. p. 266; Roxb. Fl. Ind. v. 3 (1832) p. 458; Wight, Icon. tt. 1687–88; King & Pantl. in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 189, t. 252. *Cymbidium bicolor*, Hook. f. Fl. B. I. v. 6, p. 11 (*not* of Lindl.); Trim. Fl. Ceyl. v. 4, p. 179; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519.—Flowers: Apr.–May.

KONKAN: *Stocks!, Law!*; S. Konkan, *Dalzell*, 46!; Ghâts and hilly parts of the Konkan, *Graham*; Alibag, *Dalzell & Gibson*; Salsette, *Dalzell & Gibson*. KANARA: Sirsi (N. Kanara), *Woodrow*; Chandwâr, *Ritchie*, 1419!; Kâla naddi, *Ritchie*, 1418! —DISTRIB. India (Bengal, Assam, Andaman Islands, W. Peninsula); Ceylon, Perak.

Cymbidium eburneum, Lindl. in Bot. Reg. (1847) t. 67. An epiphyte, a native of Nepal, Sikkim, and the Khasia Mountains, sometimes grown in conservatories. It has large linear-lanceolate leaves 12–24 by $\frac{2}{3}$–$\frac{3}{4}$ in., large flowers with ivory-white sepals, the petals and lip stained with pale yellow. Fl. B. I. v. 6, p. 11; Woodr. Gard. in Ind. ed. 5, p. 472.

16. **SARCOCHILUS,** Br.

Epiphytic herbs; stem very short or 0; pseudobulbs 0. Leaves oblong, coriaceous, usually flat. Flowers small, in erect or pendulous racemes. Sepals subequal, spreading; lateral sepals more or less adnate to the foot of the column. Petals like the sepals. Lip often almost shoe-shaped, adnate to the produced foot of the column, usually spurred; side lobes erect, subpetaloid or tooth-like; midlobe fleshy, various; spur erect or parallel to the blade of the lip. Column short, produced into a more or less elongated foot; rostellum short; pollinia 2 entire or sulcate; caudicle linear; gland large.—DISTRIB. East Indies, Malay Archipelago, South Sea Islands and Australia; species about 30.

A difficult genus which requires revision. Ridley [Journ. Linn. Soc. v. 32 (1896) p. 348] proposes to limit it to species with a long foot to the column, a porrect spur and a small often fleshy epichile, whereas King and Pantling [Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 206] characterize the genus as spurless. Pfitzer [Engl. & Prantl, Pflanzenf. v. 2, part 6 (1889) p. 218] makes the lip spurred or almost shoe-shaped and includes Dalzell's *Micropera* in the genus.

Leaves less than 3 in. long; racemes shorter than the leaves ... 1. *S. viridiflorus.*
Leaves 4–7 in. long; racemes much longer than the leaves ..... 2. *S. maculatus.*

Mr. Rolfe of the Kew Herbarium, whose knowledge of orchids is both varied and extensive, is of opinion that the two species named in the key above should be placed under *Sarcochilus* and not under *Saccolabium.*

1. **Sarcochilus viridiflorus,** *T. Cooke* (*not* of Hook. f. in Fl. B. I. v. 6, p. 38). A small plant 3–4 in. high, stemless; roots long. Leaves $1\frac{1}{4}$–$2\frac{1}{2}$ by $\frac{1}{4}$–$\frac{1}{2}$ in., flat, linear-oblong, 2-lobed at the apex. Flowers in few-flowered racemes scarcely reaching 1 in. long; bracts $\frac{1}{10}$ in. long, broadly ovate, obtuse. Sepals greenish-white; lateral sepals $\frac{1}{4}$ by $\frac{1}{10}$ in., obovate, obtuse, veined; dorsal sepal very slightly longer than the lateral ones, spathulate, rounded at the apex. Petals as long as the sepals, $\frac{1}{8}$ in. broad, obovate, obtuse, greenish-white. Lip rather more than $\frac{1}{4}$ in. long; side lobes erect, broadly triangular, rounded at the apex; midlobe $\frac{1}{6}$–$\frac{1}{5}$ in. long by $\frac{1}{4}$ in. broad, membranous, usually 3-lobed, the central lobe triangular, acute, the lateral lobes obtuse; spur $\frac{1}{8}$ in. long, conical, obtuse, pointing forward, parallel to the blade of the lip. *Saccolabium viridiflorum*, Lindl. in Journ. Linn. Soc. v. 3 (1858) p. 36; Hook. f. Fl. B. I. v. 6, p. 63. *Micropera viridiflora*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 282.

KONKAN: *Law!*, *Dalzell*, 26! DECCAN: Mahableshwar, *Cooke*!; Koina Valley below Mahableshwar, *Cooke*! KANARA: Usheli, *Ritchie*, 1426!; Chandwár, *Ritchie*, 1426! —DISTRIB. India (W. Peninsula).

The specific name *viridiflora* was inaugurated by Dalzell in 1851, and is therefore prior to the same specific name given by Thwaites [Enum. (1864) p. 430] to *Ærides viridiflorum*, from which Sir Joseph Hooker (Fl. B. I. v. 6, p. 38) has derived the specific name of *Sarcochilus viridiflorus.* A new specific name must therefore be found for that plant.

2. **Sarcochilus maculatus,** *Benth. in Benth. & Hook. f. Gen. Pl.* v. 3 (1883) p. 575. Almost stemless. Leaves 4–7 by 1¼–1¾ in., linear-oblong, narrowed towards the base, obliquely emarginate at the apex. Flowers in erect elongate simple racemes much longer than the leaves, many-flowered from the base; pedicels very short; bracts $\frac{1}{10}$ in. long, ovate, acute. Sepals yellow with a purple spot in the centre (*Dalzell*); lateral sepals ¼ by ⅛ in., obovate; dorsal sepal very slightly longer than the lateral ones, obovate. Petals yellow with a purple spot in the centre (*Dalzell*), as long as the dorsal sepal, ⅛ in. wide. Lip painted with white and rose-color (*Dalzell*); side lobes $\frac{1}{10}$ in. long, erect, acute from a triangular base; midlobe ⅛ by ⅙ in., resembling (as described by Dalzell) a shoe with the front leather turned backward and like a side-saddle, with membranous margins, 3-lobed at the apex, the central lobe rounded; spur short, obtuse, continuous with the foot of the column, pointing forwards, hairy within. Capsules 1¼ in. long, nearly sessile, ellipsoid, 6-ribbed. *Saccolabium maculatum*, Hook. f. Fl. B. I. v. 6 (1890) p. 64; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Micropera maculata*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 282; Lindl. in Journ. Linn. Soc. v. 3 (1858) p. 38; Dalz. & Gibs. p. 263.—Flowers: May.

KONKAN: Western Ghâts, *Dalzell!* DECCAN: Phonda Ghât, *Ritchie*, 1427! KANARA: 6 miles west of Divimana, *Woodrow.*—DISTRIB. India (W. Peninsula).

17. RHYNCHOSTYLIS, Blume.

Epiphytic herbs without pseudobulbs; stem elongate, stout, leafy. Leaves very coriaceous, linear-oblong, truncately or bluntly 2-lobed at the apex. Flowers in long pendulous many-flowered cylindric racemes, showy. Sepals spreading, broad, obtuse. Petals narrower than the sepals. Lip adnate to the short foot of the column, the hypochile forming a deep wide pubescent sac without side lobes, the epichile obovate, acute, concave, with erect margins. Column short, stout, dilated at the base, and with a very short foot; stigma small; anther terminal, rounded; pollinia 2, elliptic, attached by a slender long caudicle to a small oblong gland.—DISTRIB. Species 2 or 3, Indian and Malayan.

1. **Rhynchostylis retusa,** *Blume, Bijdr.* (1825) p. 286, t. 49. Stems 3–8 in. long, as thick as the middle finger, clothed with the sheaths of decayed leaves, emitting many stout branching roots 6–10 in. long and as thick as a swan's quill; internodes short. Leaves 6–18 by ½–1½ in., loriform, spreading and recurved, denticulate-truncate, obliquely præmorse or bluntly unequally 2-lobed at the apex, one lobe truncate, the other rounded. Flowers handsome, in dense cylindric racemes which are longer than the leaves, pale pink dotted with deeper colored spots, the lip deeper pink; peduncles short, with a few small scattered sheaths; bracts $\frac{1}{10}$–⅛ in. long, ovate, acute, persistent; pedicels with ovary ¼–½ in. long. Sepals veined; lateral sepals ⅓ by ¼ in., somewhat obliquely obovate-orbicular; dorsal sepal ⅓ by ⅙ in., obovate, rounded at the apex. Petals as long as the sepals, ⅛ in. wide, elliptic-oblong, subobtuse. Lip dark pink, clawed, with a saccate flattened spur (*hypochile*) ¼ in. deep, the portion in front of the spur (*epichile*) ⅓ in. long, the basal part of which is oblong or cuneate-oblong, $\frac{1}{10}$ in. wide, the apical part widening into a broad rounded retuse midlobe ¼ in. wide. Capsules clavate,

1–1½ in. long, acutely 3-angled and 6-ribbed, on a short stout pedicel. Fl. B. I. v. 6, p. 32; King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 213, t. 284; Trim. Fl. Ceyl. v. 4, p. 187; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1020. *Saccolabium guttatum*, Lindl. in Wall. Cat. (1828) 7308; Dalz. & Gibs. p. 263; Wight, Icon, tt. 1745–46; Bot. Mag. t. 4108. *Ærides retusum*, Sw. in Schrad. Journ. v. 2 (1799) p. 233; Grah. Cat. p. 204.—Flowers: May.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!, *Woodrow*; Salsette, *Dalzell & Gibson*. KANARA: Kála naddi, *Ritchie*!—DISTRIB. India (Sikkim; base of Himalaya, Gharwal to Bhotan, Assam, Khasia Hills, Birma, W. Peninsula); Ceylon, Malayan Archipelago.

18. ÆRIDES, Lour.

Epiphytic herbs with leafly stems; pseudobulbs 0. Leaves coriaceous, linear or terete. Flowers usually numerous and showy, in dense or lax, decurved racemes, sometimes solitary; floral bracts minute. Sepals broad, spreading; lateral sepals adnate to the base or foot of the column. Petals like the sepals. Lip adnate to the column, spurred; side lobes large, or small or 0; midlobe longer than the side lobes or smaller and incurved between them. Column short with a short or long foot; anther 2-celled, with or without a beak; pollinia 2, globose, sulcate; caudicle long or short; gland various.—DISTRIB. Species about 50, Eastern Asiatic.

Lip horizontal or inflexed.	
Flowers almost inodorous; lateral sepals ⅝ in. long, obovate; petals rose-colored, speckled with dots of a deeper color; midlobe of lip quadrate-oblong	1. *Æ. maculosum.*
Flowers sweetly fragrant; lateral sepals ⅝ in. long, obliquely oblong; petals pinkish-white, not speckled; midlobe of lip ovate	2. *Æ. crispum.*
Lip deflexed; lateral sepals ¼ in. long, elliptic or suborbicular.	3. *Æ. radicosum.*

1. **Ærides maculosum,** *Lindl. in Bot. Reg.* (1845) t. 58. Stems 1–3 in. long, stout, with many sheaths and numerous long tough roots as thick as a goose-quill, which are dry and shrivelled in the hot and cold seasons, thickening and becoming succulent during the rainy season. Leaves 6–9 by ⅝–⅞ in., linear-oblong, channelled, unequally 2-lobed at the apex. Flowers almost inodorous, in racemes 4–10 in. long, which are usually paniculately branched; peduncles green, 1½–3 in. long, with a few appressed acute sheaths; pedicels with ovary ½–⅝ in. long, rose-colored; bracts minute, ovate, acute. Sepals pale rose-colored; lateral sepals ⅝ in. long or a little longer, nearly as broad as long, obovate, sometimes slightly apiculate, somewhat gibbous, nerved; dorsal sepal as long as the lateral, rather narrower, obovate. Petals as long as the sepals, ¼ in. broad, oblong, obtuse, slightly gibbous, rose-colored, speckled with minute dots of a deeper color. Lip exceeding ¼ in. long and nearly ½ in. broad; side lobes rounded, crenulate; midlobe ¼ in. long and as broad as long, quadrate-oblong, rounded and retuse at the apex, of a dark rose-color in the centre, shaded off towards the slightly crisped margins; spur rather large, incurved like a hook. Capsules ¾–1 in. long, ellipsoid or obovoid, with 3 deep acute ribs. Fl. B. I. v. 6, p. 45; Dalz. & Gibs. p. 266; Woodr. in Journ. Bomb. Nat. v. 12

(1899) p. 519; Prain, Beng. Pl. p. 1020. *Saccolabium speciosum*, Wight, Icon. v. 5, part 1 (1852) p. 9, tt. 1674–75.—Flowers: May.

KONKAN: *Stocks*!, *Law*!, *Dalzell*, 75! DECCAN: Mahableshwar, *Cooke*!, *Woodrow*; Panchgani, *Cooke*! S. M. COUNTRY: Belgaum, west face of Cheeta Hill, *Ritchie*, 713! —DISTRIB. India (Chota Nagpur (rare), W. Peninsula).

2. **Ærides crispum**, *Lindl. in Wall. Cat.* (1828) 7319. Stem 4–10 in. long, very stout, clothed with sheaths of decayed leaves; roots long and slender, clasping the tree closely, dry and shrivelled in the dry, thickening and becoming succulent during the rainy season. Leaves 4–8 by $1\frac{1}{4}$–$1\frac{3}{4}$ in., oblong or lorate, thickly coriaceous, unequally 2-lobed at the apex, channelled, smooth, curved. Flowers sweetly fragrant, in long often paniculately branched racemes 5–12 in. long; peduncles green, 4–8 in. long, with a few acute appressed sheaths; pedicels with ovary $\frac{1}{3}$–$\frac{3}{4}$ in. long, pale pink; bracts small, ovate, acute. Sepals pinkish-white; lateral sepals $\frac{5}{8}$ by $\frac{1}{2}$ in., obliquely oblong, roundish, acute at the apex; dorsal sepal $\frac{1}{2}$ by $\frac{3}{8}$ in., obovate, obtuse, often slightly apiculate. Petals $\frac{1}{2}$ by $\frac{3}{8}$ in., broadly obovate, pinkish-white, shaded with darker pink. Lip 1 in. long, geniculately inflexed at the claw; side lobes small, oblique, straight on the lower, elliptic on the upper margin, marked with pink lines; midlobe exceeding $\frac{1}{2}$ in. long, ovate, subobtuse, somewhat 3-lobed, with reflexed and crenulate margins, darker in color than the lateral lobes, with 2 fleshy calli at the base which close the mouth of the spur; spur short, incurved, its apex often concealed beneath the reflexed edges of the lower lip. Column with a purple ring over each of the 2 pollinia. Capsules 1–$1\frac{1}{2}$ in. long, pyriform, deeply ribbed. Fl. B. I. v. 6, p. 45; Dalz. & Gibs. p. 265; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Ærides Lindleyana*, Wight, Icon. v. 5 (1852) p. 9, t. 1677; Dalz. & Gibs. p. 265.—Flowers: Apr.–May.

KONKAN: near Vingorla, *Dalzell & Gibson*; Wari country, *Dalzell & Gibson*. DECCAN: Mahableshwar, very common, *Cooke*!, *Woodrow*, *H. M. Birdwood*. KANARA: Usheli, *Ritchie*, 713!—DISTRIB. India (W. Peninsula).

3. **Ærides radicosum**, *A. Rich. in Ann. Sc. Nat.* sér. 2, v. 15 (1841) p. 65, t. 1, fig. C. Stem $1\frac{1}{2}$–4 in. long, as thick as the thumb, covered with sheaths of decayed leaves. Leaves coriaceous, 4–10 by $\frac{3}{4}$–1 in., linear-oblong, unequally 2-lobed at the apex, often mottled with purple. Flowers deep rose-colored, in stout racemes or panicles rarely exceeding the leaves; peduncles 2–3 in. long, stout; bracts $\frac{1}{10}$ in. long, ovate, acute; pedicels with ovary $\frac{1}{4}$–$\frac{1}{3}$ in. long. Sepals 5-nerved; lateral sepals $\frac{1}{4}$ in. long and as broad as long, broadly elliptic or suborbicular; dorsal sepal $\frac{1}{3}$ by $\frac{1}{6}$ in., elliptic, obtuse. Petals as long as and slightly narrower than the lateral sepals, broadly elliptic, obtuse, 5-nerved. Lip deflexed, longer than the sepals; side lobes minute; midlobe ovate; disk with 2 large basal calli; spur cylindric, obtuse, incurved. Anther beaked; caudicle of the pollinia short, subtriangular; gland large. Fl. B. I. v. 6, p. 46; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Saccolabium Wightianum*, Lindl. in Wall. Cat. 7303 in part (*not* of Dalzell & Gibson); Wight, Icon. t. 917. *Saccolabium rubrum*, Wight, Icon. v. 5, part 1 (1852) p. 9, t. 1673 (*not* of Lindl.); Dalz. & Gibs. p. 264.—Flowers: May.

KONKAN: Salsette, *Dalzell & Gibson*. DECCAN: Mahableshwar, *Woodrow*. KANARA: near Konapa on the Kála naddi, *Ritchie*, 715!—DISTRIB. India (W. Peninsula).

Woodrow in his list of Bombay plants notes this as occurring at Mahableshwar.—I have never met with it there nor does Mr. H. M. Birdwood mention it in his list of Mahableshwar and Matheran plants.

Excluded Species.

ÆRIDES ODORATUM, Lour. Fl. Cochinch. (1790) p. 525. Stem very stout. Leaves flat, keeled, oblong, blunt and obtusely 2-lobed at the apex, 6–12 by 1–1¾ in. Flowers fragrant, white with pink spots, in supra-axillary deflexed many-flowered racemes as long as or longer than the leaves; peduncles short with short distant sheaths; bracts broad, sheathing, blunt. Sepals unequal, spreading; lateral sepals larger than the dorsal, blunt; dorsal sepal elliptic, obtuse. Lip adnate to the short foot of the column; side lobes shallow, truncate, erose; midlobe linear, entire or erose, lying between the edges of the side lobes; spur large, infundibuliform, curved forwards. Anther triangular, depressed, beaked; pollinia globose; caudicle linear; gland quadrate.

In Sir J. Hooker's 'Flora of British India,' v. 6, p. 47, the word *Concan* is a misprint for *Circars*, which is the locality given by Heyne in Herb. Rottl. There are no specimens from the Konkan in Herb. Kew. Woodrow in his list of Bombay plants [Journ. Bomb. Nat. v. 12 (1899) p. 519] gives the Konkan as habitat, but has evidently done so on the authority of the 'Flora of British India.' King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 212, t. 282, give the following distribution of the plant, viz.: Sikkim, westwards to Nepal, Khasia Hills, Silhet, Chittagong, Birma, Cochinchina, China, and Java.

19. **LUISIA,** Gaud.

Epiphytic herbs with rigid, terete, usually erect sheathed stems woody below. Leaves terete, fleshy, distant, spreading. Flowers usually small, of a dull color, in short extra-axillary spikes; rhachis stout; floral bracts short, scarious, persistent. Sepals subequal or the depressed dorsal smaller. Petals equal to the sepals or much longer, spreading. Lip sessile on the base of the column, divided into 2 parts, the hypochile (basal part of lip) concave or flat, the epichile (apical part of lip) decurved, broad and ridged, entire or crenate, undulate, more or less blunt. Column stout, much shorter than the lip; stigma usually large; anther broad, 2-celled; pollinia 2, ovoid or subglobose, attached by a broad caudicle to a subquadrate or elongate gland. Capsule narrow, ridged, suberect.—Distrib. Species about 15, mostly tropical Asiatic, a few Australian.

Petals as long as the lateral sepals; epichile rhomboid-ovate with entire apex	1. *L. teretifolia.*
Petals much longer than the lateral sepals; epichile 2-lobed at the apex	2. *L. tenuifolia.*

1. **Luisia teretifolia,** *Gaud. Bot. Freyc. Voy.* (1826) p. 427, t. 37. Stem 6–12 in. long, about as thick as a swan's quill, sometimes branching and with stout vermiform roots; internodes ½–¾ in. long. Leaves terete, spreading, 3–7 by $\frac{1}{16}$–⅛ in., green spotted with purple, the tip rounded. Flowers in short 2–3-flowered spikes reaching with the peduncle 1–2 in. long. Sepals greenish-yellow; lateral sepals ⅛ by $\frac{1}{10}$ in., oblong, subacute, with a winged keel at the back; dorsal sepal linear-oblong, $\frac{1}{16}$ in. broad. Petals yellow, as long as the sepals, linear-oblong, obtuse. Lip ¼ in. long; hypochile green spotted with purple, quadrate, subsaccate; epichile dark purple, broadly cordate, rhomboid-ovate, obtuse, obscurely 3-lobed, deflexed, fleshy. Column stout, $\frac{1}{10}$ in. long; anther depressed;

pollinia 2, attached by a stout caudicle to a broadly oblong gland. Capsules $\frac{3}{4}$–$1\frac{3}{8}$ in. long. Fl. B. I. v. 6, p. 22; King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 202, t. 271; Trim. Fl. Ceyl. v. 4, p. 190; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1018. *Cymbidium triste*, Roxb. Hort. Beng. (1814) p. 63; Bot. Mag. t. 3648; Wight, Icon. t. 911 (text only). *C. tenuifolium*, Wight, Icon. t. 1689 (excluding text).—Flowers: May–June.

KONKAN: W. Ghâts, *Woodrow*. KANARA: Usheli, *Ritchie*, 1417!—DISTRIB. India (Sikkim, Khasia Hills, Bengal, Pegu, Andamans, W. Peninsula); Ceylon.

2. **Luisia tenuifolia,** *Blume, Rumph.* v. 4 (1848) p. 50. Stem 12 in. or more long, slender. Leaves 4–7 in. long, very variable in thickness, sometimes very slender, green, spreading, straight or flexuous; tip rounded. Flowers few, in short spikes $\frac{1}{2}$ in. long together with peduncle. Sepals yellowish with a purple tinge; lateral sepals $\frac{3}{8}$ by $\frac{1}{6}$ in., ovate, subacute, concave; dorsal sepal oblong, obtuse. Petals $\frac{5}{8}$ by $\frac{1}{12}$ in., linear, obtuse, of the same color as the sepals. Lip exceeding $\frac{1}{2}$ in. long, narrowly pandurate, convex, base broad, 2-auricled, tip with 2 divergent lobules, dark purple with a white patch on either side, the terminal lobes pale purple (*Trimen*); disk with 3 large calli. Fl. B. I. v. 6, p. 24; Dalz. & Gibs. p. 266; Wight, Icon. t. 911 (excluding text); Trim. Fl. Ceyl. v. 4, p. 191; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Cymbidium tenuifolium*, Lindl. Gen. & Sp. Orchid. (1833) p. 167 (exclud. syn.); Grah. Cat. p. 203.—Flowers: Aug.

KONKAN: *Stocks*!, *Law*!, *Dalzell*, 41! & 49! S. KONKAN, *Nimmo* ex *Graham*. KANARA; Bomenhali (N. Kanara), *Woodrow*.—DISTRIB. India (W. Peninsula); Ceylon.

20. **COTTONIA,** Wight.

Epiphytic; stem stout, elongate, terete, leafy, emitting stout vermiform roots. Leaves long, narrow, coriaceous; internodes short. Flowers in short racemes; peduncles very long, slender, simple or paniculately branched; bracts small. Sepals subequal, spreading. Petals rather narrower than the sepals, spreading or reflexed. Lip sessile, not jointed at the base of the column, flat, much longer than the sepals, subpandurate, 2-auricled at the base, with interposed calli; side lobes indistinct; midlobe rounded, retuse, with villous margin. Column short, without a foot; anthers depressed, hemispheric, 2-celled; pollinia 2, pyriform, 2-cleft, or 4, the 2 smaller incumbent on the larger; caudicle long, narrow; gland small.—DISTRIB. India and Ceylon; species 1.

1. **Cottonia macrostachys,** *Wight, Icon.* v. 5, part 1 (1852) p. 21, t. 1755. Stem 4–8 in. long, nearly as thick as the little finger, clothed with short appressed sheaths. Leaves 5–8 by $\frac{1}{2}$–$\frac{2}{3}$ in., lorate, spreading, straight or recurved, abruptly ending in 2 lobes, one longer and more rounded than the other with a broad acute sinus between them, keeled beneath, dull green, sometimes obscurely mottled. Flowers somewhat resembling a humble-bee, in short few-flowered racemes; peduncles 12–30 in. long, erect, green, often mottled with red, simple or branched, the branches forming terminal racemes; bracts minute, ovate, persistent; pedicels with ovary $\frac{1}{2}$–$\frac{3}{4}$ in. long; flower-buds subglobose. Sepals greenish-yellow veined with red; lateral sepals $\frac{2}{3}$ by $\frac{1}{6}$ in., ovate-

oblong, subobtuse; dorsal sepal $\frac{3}{8}$ by $\frac{1}{6}$ in., obovate-oblong. Petals greenish-yellow veined with red, $\frac{1}{3}$ by $\frac{1}{8}$ in., oblanceolate, obtuse. Lip nearly $\frac{1}{2}$ in. long by $\frac{1}{4}$ in. broad, 2-auricled at the base, subpandurate, purple with yellow villous border; side lobes obscure; midlobe rounded, retuse. Capsules $1\frac{1}{2}$–$2\frac{1}{4}$ in. long, narrowly fusiform, acutely angled. Fl. B. I. v. 6, p. 26; Dalz. & Gibs. p. 263; Bot. Mag. t. 7099; Trim. Fl. Ceyl. v. 4, p. 203; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519.—Flowers: Apr.–May.

KONKAN: *Stocks*!, *Law*!, *Woodrow*, 7!; South Konkan, *Dalzell*, 4! KANARA: N. Kanara, *Woodrow*; Supa, *Ritchie*, 1424!—DISTRIB. India (W. Peninsula); Ceylon.

21. **VANDA,** R. Br.

Epiphytic herbs; stems leafy. Leaves thickly coriaceous or fleshy, flat and keeled, or terete. Flowers large and often showy, axillary, in simple lax or dense racemes, or sometimes solitary; floral bracts much shorter than the ovary. Sepals spreading or connivent, narrowed at the base. Petals like the sepals. Lip large, usually saccate or spurred at the base; side lobes large or small (rarely obsolete), adnate to the short foot of the column or to the sides of the sac or spur; midlobe fleshy, various; disk usually ridged or lamellate, sometimes carunculate. Column short, stout, with or without a short foot; anther 2-celled; rostellum small; pollinia 2, didymous, globose, ovoid or obovoid; caudicle short and broad or long and geniculate; gland usually large.—DISTRIB. Tropical Asia and Australia; species about 20.

Stem 4–6 in. long; flowers less than 1 in. across, yellow except the blue fleshy ridges on the lip; capsule 1–$1\frac{1}{2}$ in. long	1. *V. parviflora.*
Stem 12–24 in. long; flowers $1\frac{1}{2}$–2 in. across; sepals and petals greenish with brown nerves; midlobe of lip violet; capsule 3 in. long	2. *V. Roxburghii.*

1. **Vanda parviflora,** *Lindl. in Bot. Reg.* v. 30 (1844) *Misc.* p. 45. Stem stout, 3–6 in. long, leafy, clothed with the remains of sheaths of fallen leaves, emitting large vermiform roots. Leaves 3–8 by $\frac{3}{8}$–$\frac{1}{2}$ in., linear-oblong, conduplicate, keeled, unequally and obtusely 2-lobed at the apex. Flowers in few-flowered racemes from below the leaves and about as long as them; rhachis of raceme stout; bracts $\frac{1}{12}$ in. long, ovate, acute; peduncles about as long as the racemes; pedicels with ovary $\frac{5}{8}$–$\frac{3}{4}$ in. long. Sepals yellow; lateral sepals $\frac{1}{5}$ by $\frac{1}{6}$ in., broadly obovate or suborbicular; dorsal sepal slightly longer than the lateral, $\frac{1}{8}$ in. broad, obovate-oblong. Petals yellow, $\frac{1}{6}$ by $\frac{1}{10}$ in., spathulate-oblong. Lip $\frac{1}{6}$ in. long, adnate to the foot of the column, spurred; spur narrowly infundibuliform, curved at the tip; side lobes erect, oblong, rounded, rising from the mouth of the spur; midlobe fleshy, subquadrately obovoid, decurved, the tip dilated, crenulate, truncate or retuse; disk whitish, with 2 broad fleshy lilac-colored ridges. Column short with a short foot; anther depressed; pollinia subglobose; caudicle broad, short. Capsules 1–$1\frac{1}{2}$ in. long, clavate or fusiform, with winged ridges. Fl. B. I. v. 6, p. 50; Wight, Icon. t. 1669; Trim. Fl. Ceyl. v. 4, p. 192; King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 215, t. 286; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1021. *Ærides Wightianum*, Lindl. in Wall.

Cat. 7320; Wight, Icon. v. 5, part 1 (1852) p. 8; Dalz. & Gibs. p. 265. ?*Vanda spathulata*, Grah. Cat. p. 204 (*not* of Spreng.).—Flowers: May.

KONKAN: *Stocks*!, *Law*!, *Gibson*!, *Woodrow*; S. Konkan, *Dalzell & Gibson*. DECCAN: Mâwal, *Woodrow*; hills round Mahableshwar, *Cooke*! S. M. COUNTRY: Belgaum and Kolhapur Road, *Ritchie*, 1433!—DISTRIB. India (Sikkim, Kumaon, Nepal, Assam, Birma, W. Peninsula); Ceylon.

2. **Vanda Roxburghii,** *R. Br. in Bot. Reg.* v. 6 (1820) t. 506. Stem 1–2 ft. long, stout, scandent by the stout, simple or branching roots. Leaves thickly coriaceous, 6–8 by $\frac{1}{2}$–$\frac{3}{4}$ in., recurved, complicate, obtusely keeled, præmorse, with usually 2 unequal rounded lobes and an acute interposed one. Flowers in 6–10-flowered racemes reaching with the peduncle 6–10 in. long; bracts scarious, $\frac{1}{8}$ in. long, ovate, acute; pedicels with ovary $1\frac{1}{2}$–2 in. long. Sepals yellow, tessellated with brown lines and with white margins; lateral sepals 1 by $\frac{5}{8}$ in., obovate with subcuneate bases and with more or less waved margins; dorsal sepal as long as the lateral, $\frac{1}{2}$ in. broad, obovate-oblong. Petals yellow with brown lines and white margins, shorter than the sepals, $\frac{1}{2}$ in. wide. Lip $\frac{5}{8}$ in. long, bluish dotted with purple; side lobes rising from the mouth of the spur $\frac{1}{4}$ in. long, ovate, acute, erect; midlobe $\frac{7}{16}$ in. long, pandurate, the lower part broadly elliptic, the apical portion quadrate, dilated at the fleshy 2-lobed tip; disk tumid, with fleshy ridges; spur straight, conical, obtuse, $\frac{1}{4}$ in. long. Column very short; pollinia ellipsoid or subglobose; caudicle short, broad; gland large. Capsules 3–$3\frac{1}{2}$ in. long, narrowly clavate-oblong with acute ribs and a short pedicel. Fl. B. I. v. 6, p. 52; Grah. Cat. p. 204; Wight, Icon. t. 916; Trim. Fl. Ceyl. v. 4, p. 192; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1021.—Flowers: July.

KONKAN: *Woodrow*, 1! GUJARAT: Chikli on the Atavesi River, *Gibson*! KANARA: Kâla naddi, *Ritchie*, 1425!—DISTRIB. India (Bengal, Behar, W. Peninsula); Ceylon.

22. **DIPLOCENTRUM,** Lindl.

Epiphytic herbs; stems short, leafy; pseudobulbs 0. Leaves distichous, narrow, fleshy, subterete or complicate. Flowers small, in long subspiciform racemes; peduncles lateral, sometimes branched. Sepals subequal or the lateral larger. Petals like the dorsal sepal. Lip sessile, jointed on the base of the column, spreading, entire, shortly 2-spurred; disk fleshy. Column very short, 2-auricled, truncate; anther 2-celled; pollinia 2, ovoid, sulcate or 2-partite, attached by a broad caudicle to a broad gland.—DISTRIB. Species 2 or 3, Indian.

1. **Diplocentrum congestum,** *Wight, Icon.* v. 5 (1852) part 1, p. 10, t. 1682. Stem short. Leaves 3–$3\frac{1}{2}$ by $\frac{2}{5}$–$\frac{5}{8}$ in., linear-oblong, recurved, unequally and obtusely 2-lobed at the apex. Flowers numerous, in pendulous sometimes sparingly branched racemes 3–6 in. long; bracts spreading, triangular-ovate, $\frac{1}{20}$–$\frac{1}{8}$ in. long; pedicels $\frac{1}{8}$ in. long. Sepals dull brownish-green, $\frac{1}{8}$–$\frac{1}{6}$ in. long; lateral sepals reflexed. Petals colored as the sepals, $\frac{1}{10}$–$\frac{1}{8}$ in. long, elliptic-oblong, obtuse. Lip about $\frac{1}{6}$ in. long, rose-colored, reflexed and truncate at the apex, rather broader and obtusely keeled at the base; spurs 2, saccate-oblong, $\frac{1}{16}$ in. long, slightly divergent. Capsules less than $\frac{1}{2}$ in. long, oblong, shortly pedicellate.

Fl. B. I. v. 6, p. 78; Rolfe, in Hook. Icon. Pl. v. 27 (1901) t. 2687.—Flowers: June–Sept.

Rare. KANARA: Sirsi-Kumpta road (N. Kanara), *Woodrow*!—DISTRIB. India (W. Peninsula).

23. **ACAMPE,** Lindl.

Epiphytic herbs; stem usually very long and stout. Leaves thickly coriaceous, keeled, distichous, oblique at the apex. Flowers corymbose, in large spreading panicles, fleshy, brittle, yellow, spotted; peduncles short, rigid, lateral; bracts broad, short, persistent. Sepals fleshy, brittle, flat; lateral sepals adnate to the usually small spur of the lip; dorsal sepal often slightly larger than the lateral ones. Petals like the sepals, straight. Lip fleshy, bent upwards, saccate or spurred, adnate to the footless column, often tuberculate and pubescent within the sac. Column short, thick, without a foot; anthers ovate, 2-celled; pollinia 2, waxy, globose; caudicle slender, linear, longer than the pollinia; gland small, subrotund.—DISTRIB. Tropical Asia; species 8 or 9.

The genus was founded by Lindley in 1853 [Fol. Orchid. (*Acampe*)]. The 'Flora of British India' places it as a section (*Acampe*) under *Saccolabium*, but the genus seems sufficiently well defined to have independent rank accorded to it. Ridley remarks [Journ. Linn. Soc. v. 32 (1896) p. 346] that there seems no good reason why the genus should be merged in *Saccolabium*. Pfitzer [Engl. & Prantl, Pflanzenf. v. 2, part 6 (1889) p. 213] keeps the genus distinct and Mr. Rolfe of the Kew Herbarium is also in favor of so maintaining it.

1. **Acampe Wightiana,** *Lindl. Fol. Orchid.* (1853) p. 2 (*Acampe*). Stem 12–18 in. long, as thick as the little finger, clothed with sheaths of fallen leaves; internodes short; roots long, very stout. Leaves 4–8 by $\frac{5}{8}$–$1\frac{1}{4}$ in., ligulate, thickly coriaceous, flat, irregularly 2-lobed at the apex, the lobes rounded, usually with an acute sinus. Flowers corymbose, in supra-axillary panicles $1\frac{1}{2}$–$2\frac{1}{2}$ in. long including the peduncle; peduncle about as long as the panicle, stout, with many cupular sheaths; bracts short, broadly ovate, persistent; pedicels with ovary $\frac{1}{8}$–$\frac{1}{4}$ in. long. Sepals yellow, barred with red; lateral sepals $\frac{3}{8}$ by $\frac{1}{5}$ in., elliptic-oblong, obtuse; dorsal sepal as long and as broad as the lateral ones, obovate-oblong, obtuse. Petals yellow, barred with red, $\frac{1}{3}$ by $\frac{1}{10}$ in., obovate, obtuse. Lip less than $\frac{1}{3}$ in. long, white, with a few transverse red stripes; side lobes small, rounded; midlobe $\frac{1}{5}$ in. long, ovate, obtuse, fleshy; spur a short rounded sac. Pollinia 2, large, globose; caudicle short; gland small. Capsules $1\frac{1}{2}$–3 in. long, sessile or nearly so, clavate, or oblong, or fusiform, with many ribs. *Acampe excavata*, Lindl. Fol. Orchid. (1853) p. 3 (*Acampe*). *Saccolabium Wightianum*, Hook. f. Fl. B. I. v. 6 (1890) p. 62; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Trim. Fl. Ceyl. v. 4, p. 199. *Saccolabium præmorsum*, Hook. f. Fl. B. I. v. 6 (1890) p. 52; Prain, Beng. Pl. p. 1022. *S. papillosum*, Dalz. & Gibs. Bo. Fl. (1861) p. 264 (*not* of Lindl.). *Ærides præmorsum*, Grah. Cat. p. 204 (*not* of Willd.). *Vanda Wightiana*, Lindl. ex Wight, Icon. v. 5, part 1 (1852) p. 9, t. 1670.—Flowers: May.

KONKAN: *Graham, Stocks*!, *Law*!, *Woodrow*, 5!; Indapur (S. Konkan), *Graham*. S. M. COUNTRY: Belgaum, *Ritchie*, 716!—DISTRIB. India (Bengal, W. Peninsula); Ceylon.

I cannot separate *Acampe excavata*, Lindl., from this. The material in Herb. Kew. is scanty and an examination of fresh specimens much to be desired.

24. **SARCANTHUS,** Lindl.

Epiphytic herbs; stems usually elongate; pseudobulbs 0. Leaves fleshy, terete or flat. Flowers small, in extra-axillary racemes or panicles; bracts small. Sepals subequal, all spreading or reflexed, or the dorsal concave or connivent over the column. Petals rather smaller than the sepals, spreading. Lip adnate to the base of the column or to its foot; base with an infundibuliform spur sometimes dilated at the apex, divided by a longitudinal septum reaching from the base to about half-way up or higher, but not reaching the mouth, with a callus both on the upper and lower walls; side lobes small, more or less triangular and acute; midlobe small, triangular or hastate. Column short, stout, often with a foot as long as or longer than itself; anther depressed; pollinia 2, bifid.—DISTRIB. Eastern Tropical Asia; species about 35.

1. **Sarcanthus peduncularis,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 343. Stem 10–12 in. long, about as thick as a duck's quill, pendulous, leafy. Leaves coriaceous, 4–6 by $\frac{1}{4}$ in., linear, obtusely acuminate, narrowed at the base, straight or falcately recurved, the sheaths ribbed. Flowers deflexed, in racemes which are shorter than the leaves; bracts minute, ovate, acute, persistent; pedicel with ovary $\frac{1}{12}$ in. long. Sepals yellow with red margins; lateral sepals $\frac{1}{6}$ by $\frac{1}{10}$ in., elliptic, obtuse; dorsal sepal slightly longer and slightly narrower than the lateral ones, spathulate-oblong. Petals $\frac{1}{8}$ by $\frac{1}{12}$ in., spathulate, colored like the sepals. Lip white or yellowish, with violet side lobes, $\frac{1}{8}$ in. long; side lobes triangular, acute, small; midlobe incurved, acute; spur $\frac{1}{10}$–$\frac{1}{8}$ in. long, subcylindric or conical, septate almost to the mouth. Column short; anther with a long subulate beak; pollinia 2-partite; caudicle slender; gland small. Capsules $\frac{2}{3}$–$\frac{3}{4}$ in. long, fusiform or oblong, sessile or nearly so. Fl. B. I. v. 6, p. 67; Dalz. & Gibs. p. 264; Trim. Fl. Ceyl. v. 4, p. 200. *Sarcanthus pauciflorus*, Wight, Icon. v. 5 (1852) part 1, p. 20, t. 1747 (*bad*).—Flowers: July-Aug.

KONKAN: *Stocks*, 35!, *Law*!; near the village of Virdi in Wari country, *Dalzell*! KANARA: Kála naddi, *Ritchie*, 1430!—DISTRIB. India (W. Peninsula); Ceylon.

25. **POGONIA,** Juss.

Terrestrial, tuberous-rooted, 1-leaved herbs; tuber giving off below the surface of the ground 2 or 3 stolons, each producing at its tip a tuber smaller than that of the parent. Leaf broadly cordate or orbicular, strongly plicate, from the same tuber as the flowers, but usually subsequent to the appearance of the flowering scape, occasionally contemporaneous with the flowers. Flowers solitary, or few, or several, racemose, often pendulous on scapes arising from the tuber. Sepals subequal, narrow, connivent or spreading. Petals like the sepals. Lip adnate to the base of the column, sometimes slightly saccate at the base, rather narrow, the lower portion convolute round the column; side lobes small or 0; midlobe flat, ovate or orbicular, entire or fimbriate. Column elongate, clavate upwards; stigma anticous, oblong or orbicular; anther more or less incumbent, substipitate; pollinia 2 or 4, elongate, powdery, often coherent, without caudicle or gland.—DISTRIB. Species about 60, Asiatic, American, and African.

Scapes 1–3-flowered; bracts $\frac{1}{10}$ in. long; lip without side lobes ...	1. *P. plicata.*
Scapes many-flowered; bracts $\frac{1}{2}$ in. long; lip with obtuse side lobes.	2. *P. carinata.*

1. **Pogonia plicata,** *Lindl. Gen. & Sp. Orchid.* (1840) p. 415. Tuber globose, ½ in. in diam. or less. Leaf dark green mottled with purplish-brown, lying flat on the ground and appearing after the flowers have withered, 2–4 in. long and nearly as broad as long, broadly ovate or suborbicular, obtuse, acute or shortly acuminate, many-nerved from a cordate base; petioles ¾–2½ in. long. Scape 3–6 in. long with 2 or 3 tubular sheaths with subacute dilated apices. Flowers 2 or 3; floral bract $\frac{1}{10}$ in. long, ovate, acute. Sepals ⅝ by $\frac{1}{16}$ in., linear-lanceolate, acuminate, yellowish-green. Petals like the sepals and similarly colored. Lip lilac with a green spot at the base and a yellow line along the thickened part of the midrib, less than ½ in. long, convolute and embracing the column, entire except the minutely emarginate apex, the midrib thickened and callus-like for more than half its length, the base slightly saccate. Column narrowed in the lower half, the upper portion clavate; pollinia 4, narrowly oblong. Fl. B. I. v. 6, p. 119; King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 268, t. 358; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1025. ? *Pogonia flabelliformis,* Dalz. & Gibs. Bo. Fl. (1861) p. 270 (*not* of Lindl.).—Flowers: June.

Konkan: *Stocks!, Law!* Deccan: Lanoli, *Woodrow!*; Khandala, *Cooke!*—Distrib. India (Bengal, W. Peninsula).

2. **Pogonia carinata,** *Lindl. Gen. & Sp. Orchid.* (1840) p. 414. Leaf 1½–2½ in. in diam., orbicular, cuspidate, 7–9-nerved, glabrous, base broadly cordate, the central part cuneate; petioles 1–3 in. long. Flowers numerous, in racemes measuring with the stems 6–12 in. long; bracts linear, acute, ½ in. long. Sepals pale-green, ⅛ in. long, oblong-lanceolate, acuminate, nerved. Petals like the sepals in form and color. Lip with purple veins and spots on a pale greenish-yellow ground, ¾ in. long, not saccate at the base, 3-lobed about the middle; side lobes $\frac{1}{10}$ in. long, rounded; midlobe ⅛ in. long, ovate-oblong, subobtuse, crenulate. Fl. B. I. v. 6, p. 121; Dalz. & Gibs. p. 270; Prain, Beng. Pl. p. 1026. *Pogonia flabelliformis,* Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Epipactis carinata,* Roxb. Fl. Ind. v. 3 (1832) p. 454; Grah. Cat. p. 205.—Flowers: May–June.

Konkan: *Stocks!, Law!* Deccan: Lanoli, *Woodrow.* S. M. Country: near Dharwar, *Law* ex *Stocks,* 68! Kanara: *Law!*—Distrib. India (Bengal, W. Peninsula).

26. **SPIRANTHES,** Rich.

Terrestrial leafy herbs with tuberous or fibrous roots. Leaves linear (in the Indian species). Flowers small, secund, on a twisted erect spike. Sepals subequal, free or sometimes cohering with the petals to form an erect hood; lateral pair gibbous at the base. Petals like the dorsal sepal. Lip erect, entire or 3-lobed, the base concave but neither saccate nor spurred; disk bearing lamellæ or calli. Column short, terete; stigma single, broad, anticous; rostellum erect, obtuse, or elongate and 2-fid; anther erect, 2-celled; pollinia 4, united in pairs, sessile on a small gland.—Distrib. Species about 80, temperate and tropical.

1. **Spiranthes australis,** *Lindl. in Bot. Reg.* v. 10 (1824) sub t. 823. Whole plant 6–18 in. high; stem stout or slender; roots consisting of elongate fleshy white cylindric or almost tuberous fibres.

Leaves 4–5, alternate, usually clustered near the base of the stem, 1½–5 by ¼ in., linear or linear-lanceolate, acute or acuminate, sometimes oblanceolate, shortly sheathing. Stem with a few distant acute sheaths (reduced leaves). Flowers numerous, in spikes 3–6 in. long on a glandular-pubescent spirally twisted rhachis; bracts ovate, acute or acuminate, exceeding the sessile ovary. Sepals ⅛ by $\frac{1}{16}$ in., subequal, ovate-oblong, acute, with broad bases. Petals slightly shorter than the sepals, $\frac{1}{25}$ in. broad, linear, obtuse, more or less connate with the dorsal sepal into a hood. Lip $\frac{1}{10}$–⅛ in. long, 3-lobed, dilated at base and apex, the base subsaccate, 2-glandular, the apex subquadrate, truncate, retuse, crenulate. Pollinia cohering, clavate. Capsules ½ in. long, fusiform, ribbed. Fl. B. I. v. 6, p. 102; Dalz. & Gibs. p. 270; Wight, Icon. t. 1724 (*middle and right-hand figs.*); King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 278, t. 369; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1028.

Rare in the Bombay Presidency. KONKAN: *Stocks*! S. M. COUNTRY: Chorla Ghát, *Dalzell & Gibson*. KANARA: *Dalzell*, 40!—DISTRIB. Throughout the mountainous parts of India at suitable elevations; Ceylon, Afghanistan, Northern Asia, China, Java, Australia, New Zealand.

27. **ZEUXINE,** Lindl.

Terrestrial herbs; stems decumbent at the base, succulent, glabrous. Leaves membranous, sometimes withering at flowering time. Flowers small, in racemes or spikes. Sepals usually subequal; lateral pair free; dorsal sepal concave and forming a hood with the petals. Petals like the dorsal sepal. Lip adnate to the base of the column, cymbiform or saccate, the apical lobe shortly clawed or sessile, divided into 2 oblong subquadrate more or less truncate divergent lobules, or entire, or with narrow decurved lobules; sac at the base with calli or laminæ inside. Column very short, its anterior face with lamellar or conical processes; stigmas 2, lateral, distant; anther membranous, sometimes ridged, its cells contiguous; pollinia pyriform, attached by an oblong gland to the erect rostellum.—DISTRIB. Species about 20, Tropical Asiatic and African.

Leaves linear, sessile; lip not longer than the sepals; pollinia sessile on an oblong gland	1. *Z. sulcata.*
Leaves ovate, petiolate; lip twice as long as the sepals; pollinia adnate for two-thirds of their length to the linear appendage of the gland	2. *Z. longilabris.*

1. **Zeuxine sulcata,** *Lindl. Gen. & Sp. Orchid.* (1840) p. 485. Whole plant 2–10 in. high; stem passing into the peduncle, leafy, glabrous. Leaves 1–2 by ⅛–¼ in., linear, acuminate, clasping, sessile on the hyaline truncate sheaths, gradually passing into linear bracts upwards. Flowers in densely-flowered racemes ½–2 in. long; bracts ⅓ in. long, much exceeding the ovary, ovate, caudate-acuminate, erect, membranous; pedicels very short. Sepals unequal, greenish-white; lateral pair ⅛ by $\frac{1}{16}$ in., smaller than the dorsal, obliquely ovate-oblong, subobtuse; dorsal sepal ⅛ by $\frac{1}{10}$ in., concave, ovate, obtuse. Petals greenish-white, slightly shorter than the dorsal sepal, $\frac{1}{16}$ in. broad, falcately oblong, obtuse, united with the dorsal sepal to form a hood over the column. Lip ⅛ in. long, hammer-headed, yellow, with a small cymbiform sac at the base; apical lobe $\frac{1}{20}$ by $\frac{1}{12}$ in., subquadrate,

entire or emarginate at the apex. Column very short, with 2 wings at its apex covering the anther; arms of rostellum short, stout, parallel; anther depressed, very shortly beaked, covered by the wings of the column; pollinia clavate, sessile on an oblong gland. Fl. B. I. v. 6, p. 106; King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 286, t. 381; Trim. Fl. Ceyl. v. 4, p. 215; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1029; Watt, Dict. Econ. Prod. v. 6, part 4, p. 355. *Zeuxine bracteata*, Wight, Icon. v. 5, part 1 (1852) p. 16, t. 1724 (*bis*). *Z. brevifolia*, Wight, Icon. l. c. t. 1725. *Z. robusta*, Wight, Icon. l. c. t. 1726.—Flowers: Jan.

Konkan: *Stocks*!, *Law*! Deccan: hills in the Deccan, *Cooke*!, *Woodrow*! S. M. Country: Dharwar, *Law*! Kanara: *Law*! Sind: *Stocks*, 411!—Distrib. Throughout India; Ceylon, China, Japan, Java, Afghanistan, Philippines.

2. **Zeuxine longilabris,** *Benth. in Benth. & Hook. f. Gen. Pl.* v. 3 (1883) p. 600. Whole plant about 6–10 in. high, slender, ascending from a creeping and rooting base, about as thick as a crow's quill. Leaves few, rather distant, 1–1¾ by ⅓–½ in., shortly petiolate, ovate or ovate-oblong, acute, 7-nerved, glabrous, base rounded; sheaths short, hyaline, inflated. Flowers in lax few-flowered spikes; scape including the spike 4–10 in. long, very slender, pubescent, with 2 or 3 distant lanceolate sheaths; rhachis of spike glandular-pubescent, 2–3 in. long; bracts about as long as the pubescent ovary, narrowly lanceolate. Sepals ¼ in. long, greenish, oblong, obtuse, pubescent. Petals white, twice as long as the sepals. Lip with a claw which is saccate at the base, gradually dilated into the deeply 2-lobed obovate-cuneate midlobe, the cuneate lobes or wings of which are separated by a narrow acute sinus and are crenulate or coarsely toothed on the outer margin; sac with 2 spurs in the cavity. Anther with a long beak; pollinia pyriform, adnate for two-thirds of their length to the linear appendage of the small gland. Fl. B. I. v. 6, p. 107; Trim. Fl. Ceyl. v. 4, p. 216; Prain, Beng. Pl. p. 1029. *Monochilus longilabre*, Lindl. Gen. & Sp. Orchid. (1840) p. 487; Dalz. & Gibs. p. 271. *M. affine*, Wight, Icon. v. 5, part 1 (1852) p. 16, t. 1728.

Rare in the Bombay Presidency. Konkan: *Law*!, *Stocks*!—Distrib. India (Bengal, Assam, W. Peninsula); Ceylon.

28. **CHEIROSTYLIS,** Blume.

Terrestrial herbs; stems decumbent and succulent at the base. Leaves membranous. Flowers few, racemose. Sepals united in their lower half into a ventricose tube. Petals shorter than the sepals. Lip saccate or cymbiform at the base, the sac with enclosed calli or setæ, the anterior lobe shortly clawed, 2-lobed or fimbriate. Column short with 2 long fleshy appendages in front; rostellum 2-cleft; stigmas 2, lateral; anther erect, its cells short; pollinia 2, bipartite; caudicle short; gland oblong.—Distrib. Species about 12, chiefly Indian and Malayan.

1. **Cheirostylis flabellata,** *Wight, Icon.* v. 5, part 1 (1852) p. 16. Whole plant 4–8 in. high. Leaves thin, ½–¾ by ⅜–½ in., ovate, acute, 3-nerved and reticulately veined, glabrous, base rounded or subcordate; sheaths hyaline, truncate, inflated; petioles ⅛–⅜ in long. Flowers few, white, in short racemes which rarely reach 1 in. long; scapes 6–7 in.

long, slender; sheaths few, loose, acuminate; bracts $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovate, acuminate. Sepals $\frac{1}{5}$ in. long, united half-way up into a ventricose tube, the lobes ovate-oblong. Petals linear-oblong, falcate, obtuse, the tips exserted. Lip $\frac{1}{4}$ in. long, with a short saccate claw and a broad spreading suborbicular 2-lobed limb, the lobes sub-5-fid; sac cymbiform, with 2 enclosed calli. Column short; appendages and rostellar arms long, subspathulate; anther with a dilated membranous tip; pollinia 2, pyriform, subsessile on the elongate gland. Fl. B. I. v. 6, p. 105; Dalz. & Gibs. p. 271; Trim. Fl. Ceyl. v. 4, p. 211; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Monochilus flabellatum*, Wight, Icon. t. 1727. —Flowers: Mar.

S. M. COUNTRY: Chorla Ghát, *Dalzell & Gibson.* KANARA: Kumpta-Sirsi road, *Woodrow.*—DISTRIB. India (Bhotan Himalaya, Tenasserim, W. Peninsula); Ceylon.

29. **PERISTYLUS,** Blume.

Terrestrial herbs. Sepals and petals free, subequal, connivent or subconnivent. Lip continuous with the column, free or slightly adnate to it, produced at the base into a short (sometimes very short) spur, erect or somewhat spreading, entire or 3-lobed. Column short, footless; clinandrium erect, short. Anther-cells parallel; apex inferior, short and adnate to the base of the column; pollinia granular with short caudicles and exserted naked glands; staminodes lateral, auriculate. Stigma sessile. Rostellum subulate or tooth-like, situated between the anther-cells. Capsule ellipsoid or oblong.—DISTRIB. Throughout the N. temperate regions and in the tropics of Asia and Africa, chiefly in the mountains; species 40 or 50.

Spur as long as or longer than the sepals, subclavate	1. *P. Stocksii.*
Spur shorter than the sepals, globose or ellipsoid.	
Stem leafy, the leaves scattered or subimbricate	2. *P. spiralis.*
Leaves clustered about the middle of the stem.	
Lip shorter than the sepals; petals white	3. *P. plantagineus.*
Lip as long as the sepals; petals yellow or yellowish-green.	
Lateral sepals mucronate at the back below the apex; spikes dense, 4–12 in. long.....	4. *P. goodyeroides.* var. *affinis.*
Lateral sepals not mucronate at the back below the apex; spikes lax, 2–3 in. long.....	5. *P. Lawii.*

1. **Peristylus Stocksii,** *Kraenzlin, Orchid. Gen. et Sp.* v. 1 (1898) p. 513. Whole plant 6–18 in. high; stem slender, with numerous sheaths in the lower part. Leaves more or less clustered towards the middle of the stem, variable, 3–4 by $\frac{1}{2}$–$1\frac{1}{2}$ in., obovate or elliptic, or lanceolate, obtuse, acute or acuminate, usually petiolate. Flowers yellowish, in twisted spikes 3–6 in. long; peduncles with a few scales between the leaves and the spike; bracts $\frac{1}{5}$–$\frac{5}{8}$ in. long, ovate, acuminate, the lower bracts longer than the upper, sometimes shorter than the curved ovary. Sepals 1-nerved; lateral sepals $\frac{1}{10}$ by $\frac{1}{20}$ in. long, oblong, obtuse; dorsal sepal $\frac{1}{10}$ by $\frac{1}{12}$ in., elliptic-oblong, obtuse. Petals $\frac{1}{10}$ in. long, obliquely ovate, obtuse, subfleshy. Lip $\frac{1}{8}$ in. long, 3-lobed at the apex, the lobes shorter than the sepals; claw broad, concave; lateral lobes a little shorter and narrower than the midlobe, slightly incurved; midlobe $\frac{1}{16}$–$\frac{1}{12}$ by $\frac{1}{30}$ in., oblong, obtuse; spur $\frac{1}{6}$–$\frac{1}{5}$ in. long, inflated downwards, shorter than the ovary. Pollinia clavate. Stigmatic lobes clavate.

Rostellum reduced to a triangular tooth. *Habenaria Stocksii*, Hook. f. Fl. B. I. v. 6 (1890) p. 158; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520.—Flowers: July–Aug.

KONKAN: *Dalzell!*, *Law!*; Dronaghiri, *Stocks!*; Neral below Matheran, *Bhiva!* S. M. COUNTRY: Rámghát, *Ritchie*, 1398!—DISTRIB. India (W. Peninsula).

2. **Peristylus spiralis,** *A. Rich. in Ann. Sc. Nat.* sér. 2, v. 15, p. 69, t. 2, B. Whole plant 6–18 in. high; stem leafy, often flexuous; tubers small, oblong, pyriform or globose. Leaves 1–2½ by ¼–⅜ in., linear-lanceolate, obtuse, acute or acuminate, coriaceous, 5–7-nerved, sheathing at the base, the upper passing into numerous lanceolate sheaths. Flowers greenish-white, secund, in spirally twisted lax-flowered slender spikes 2–10 in. long; bracts ¼–⅜ in. long, lanceolate, finely acuminate, equalling or the lower exceeding the ovary. Lateral sepals ⅛ by $\frac{1}{30}$ in., linear, obtuse, falcate; dorsal sepal ⅛ by $\frac{1}{20}$ in., linear-oblong, obtuse, concave. Petals ⅛ by $\frac{1}{16}$ in., ovate-oblong or linear-oblong, obtuse. Lip variable, fleshy, ⅛ in. long, rather longer than broad, with a short broad concave claw, 3-lobed nearly to the middle; side lobes usually slightly longer and much narrower than the midlobe, linear, acute, more or less spreading; midlobe $\frac{1}{16}$ by $\frac{1}{30}$ in., linear, obtuse; spur a small globose sac $\frac{1}{20}$ in. in diam. Anthers minute, the cells parallel; tubes 0; pollinia pyriform; caudicle short; glands oblong. Stigmatic processes short, clavate. Rostellum 3-fid. Wight, Icon. t. 1696; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1898) p. 510. *Habenaria torta*, Hook. f. Fl. B. I. v. 6 (1890) p. 159; Trim. Fl. Ceyl. v. 4, p. 234; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520.

KONKAN: *Law!*, *Stocks*, 67!; Western Ghâts southwards, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

3. **Peristylus plantagineus,** *Lindl. Gen. & Sp. Orchid.* (1835) p. 300. Whole plant 12–20 in. high; stem robust, leafy chiefly about the middle, closely embraced by many long narrowly lanceolate sheaths above the leaves, and with loose sheaths below them; tubers large, cylindric-oblong. Leaves few, 4–8 by 1¾–2½ in., oblong-lanceolate, or elliptic-lanceolate, acuminate, strongly nerved beneath, closely sheathing at the base. Flowers in dense spikes 4–8 in. long; bracts reaching ⅝ in. long, erect, narrowly lanceolate, acuminate. Sepals greenish; lateral sepals ⅛ by $\frac{1}{12}$ in., elliptic-oblong, obtuse; dorsal sepal ⅛ by $\frac{1}{10}$ in., oblong, obtuse. Petals white, very broad, obliquely orbicular, subcartilaginous, the tips recurved; nerves branching. Lip white, shorter than the sepals, broadly obovate, entire or shortly 3-lobed; lobes obtuse, contracted beyond the very short broad concave base; spur small, scrotiform. Anther-cells parallel; tubes short, recurved; pollinia clavate; caudicles short; glands small. Stigmatic processes short, stout. Rostellum short, acute. Wight, Icon. t. 921; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1898) p. 516. *Peristylus elatus*, Dalz. & Gibs. in Kew Journ. Bot. v. 3 (1851) p. 344; Dalz. & Gibs. p. 270. *Habenaria Wightii*, Trimen, Cat. Ceyl. Pl. (1885) p. 91; Hook. f. Fl. B. I. v. 6 (1890) p. 162; Trim. Fl. Ceyl. v. 4, p. 232; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520.—Flowers: July.

KONKAN: *Nimmo!*; Malwán, *Dalzell.* S. M. COUNTRY: Rámghát, *Ritchie*, 1396! KANARA: *Law!*—DISTRIB. India (W. Peninsula); Ceylon.

4. **Peristylus goodyeroides,** *Lindl.* VAR. *β*, **affinis,** *Lindl. Gen. & Sp. Orchid.* (1835) p. 300. Stem 1–2 ft. high, stout. Leaves close together about the middle of the stem, 6–10 by 2–2½ in., elliptic-lanceolate, acute, contracted at the base, scarcely petiolate. Flowers yellowish-green, in dense spikes 4–12 in. long; bracts ½–¾ in. long, lanceolate, membranous, finely acuminate, the lower longer than, the upper equalling the sessile ovary. Lateral sepals ⅛ by 1/12 in., oblong, obtuse, mucronate at the back below the apex; dorsal sepal ⅛ by 1/10 in., elliptic-oblong, obtuse, not mucronate. Petals ⅛ by ⅛ in., obliquely obovate, strongly nerved. Lip ⅛ by ⅛ in., without a claw, usually 3-fid, the lobes very variable; spur subglobose, 1/12 in. long. Anther small; tubes very short; pollinia clavate. Rostellum erect, toothed. *Peristylus goodyeroides*, Dalz. & Gibs. p. 270. *Habenaria goodyeroides*, Grah. Cat. Bo. Pl. (1839) p. 201 (*not* of Don); Hook. f. Fl. B. I. v. 6, p. 161; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520. *H. goodyeroides* var. *affinis*, King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 327, t. 430 *bis*. *H. affinis*, Don, Prodr. Fl. Nep. (1825) p. 25 (*not* of Wight).—Flowers: Aug.

KONKAN: *Nimmo!*, *Dalzell!*; S. Konkan, *Dalzell & Gibson.*—DISTRIB. India (Nepal, Khasia Hills, Naga Hills, Sikkim, W. Peninsula).

5. **Peristylus Lawii,** *Wight, Icon.* v. 5, part 1 (1852) p. 12, t. 1695. Stem 6–12 in. high with loose sheaths below the leaves. Leaves 3–5 from about the middle of the stem, membranous, not reduced to bract-like leaves above, 2½–4 by ¾–1½ in., oblong-lanceolate, acute, sheathing at the base. Flowers small, yellow, in narrow strict slender lax spikes 2–3 in. long; bracts ⅜ in. long or more, exceeding the ovary, lanceolate, acuminate. Sepals 1-nerved; lateral sepals ⅛ by 1/16 in., oblong, obtuse; dorsal sepal ⅛ by 1/10 in., oblong, obtuse, concave. Petals ⅛ by 1/16 in., oblong, obtuse. Lip ⅛ by 1/10 in. with a concave claw, shortly 3-lobed at the apex; lobes 1/30 in. long, subequal, obtuse, the 2 lateral lobes rounded on the outer edge, slightly curved, the midlobe straight; spur short, scrotiform, 1/20 in. long. Anther-tubes 0; pollinia clavate; caudicle 0; glands small. Stigmatic processes very short, clavate. Rostellum short, triangular, acute. Dalz. & Gibs. p. 270; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1898) p. 510. *Habenaria Lawii*, Hook. f. Fl. B. I. v. 6 (1890) p. 162; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Prain, Beng. Pl. p. 1032.—Flowers: Aug.

KONKAN: *Dalzell!*, *Law!*; Neral below Matheran, *Bhiva!* S. M. COUNTRY: Belgaum, *Law!*; near Dharwar, *Law* ex *Stocks*, 73!—DISTRIB. India (Bengal, Behar, W. Peninsula).

30. **PLATANTHERA,** Rich.

Terrestrial herbs. Tubers ovoid-globose, rarely lobed. Flowers small or large, in lax or dense spikes or racemes; bracts mostly narrow. Sepals unequal, free; lateral more or less spreading or reflexed. Petals simple, usually narrower than the dorsal sepal and appressed to it forming a hood. Lip continuous with the column, sometimes shortly adnate to it, produced at the base into a short or elongate spur, entire or 3-lobed; side lobes sometimes fimbriate or pectinate. Column short, footless; clinandrium erect, short, or scarcely as long as the anther. Anther-cells parallel or divergent; apex inferior, short and

adnate to the side lobes of the rostellum; pollinia granular, with short caudicles and exserted naked glands; staminodes lateral, small, rounded or auriculate. Stigmas sessile or subsessile, more or less confluent, often pulvinate. Rostellum 3-lobed; middle lobe subulate or tooth-like, situated between the anther-cells; side lobes short. Capsule ellipsoid or oblong.—DISTRIB. Throughout the N. temperate regions and in the tropics of Asia and Africa, chiefly in the mountains; species 60 or 70.

I have followed Kraenzlin in rehabilitating this genus, a course which has been followed in Dyer's recently published 'Flora of Tropical Africa.' It is distinguished from *Habenaria* by the short, more or less confluent stigmas.

1. **Platanthera Susannæ,** *Lindl. Gen. & Sp. Orchid.* (1835) p. 295. A tall stout herb 2–4 ft. high; stem leafy up to the inflorescence. Leaves 2–6 by 1–2 in., ovate-oblong or oblong-lanceolate, imbricating, acute or acuminate, the upper sheathing, becoming smaller and passing into large leafy bracts above. Flowers white, fragrant, very shortly pediceliate, in 3–6-flowered racemes; bracts leafy, 2½–3 in. long. Lateral sepals 1½ by ¾ in., obliquely subquadrately oblong, ascending; dorsal sepal 1½ in. long and as broad as long, broadly rhomboid, spreading. Petals 1¼ by ⅛ in., linear, acute. Lip 1½ in. long; side lobes 1½ in. long, truncate, the outer margins pectinate in the middle; mid-lobe 1¼ by ¼ in., linear or dilated downwards; spur 4 in. long, more than twice as long as the ovary. Anther very broad and large; pollinia linear, about as long as their caudicle. Capsules together with pedicels 2 in. long, ellipsoid, beaked; pedicels stout, ¼ in. long. Dalz. & Gibs. p. 269; Wight, Icon. t. 920; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1898) p. 601. *Habenaria Susannæ*, R. Br. Prodr. (1810) p. 312; Hook. f. Fl. B. I. v. 6 (1890) p. 137; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1030. *H. gigantea*, Don, Prodr. Fl. Nep. (1825) p. 24; Grah. Cat. p. 201.—Flowers: Sept. VERN. *Wagchora.*

KONKAN: Matheran, *Cooke*!, *H. M. Birdwood.* DECCAN: Khandala, *Stocks*, 7!, *Cooke*!, *Graham, Woodrow*; Mahableshwar, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 1395!—DISTRIB. India (Khasia, Naga and Manipur Hills, Birma, Hills of the Western Peninsula); China, Malay Islands.

31. **HABENARIA,** Willd.

Terrestrial usually leafy herbs with undivided or lobed tubers. Leaves flat with sheathing bases. Flowers spicate or racemose, usually green or yellow, or the sepals green and the petals white; bracts mostly narrow. Sepals unequal; lateral sepals more or less spreading or reflexed. Petals simple or 2-lobed or 2-partite (very rarely 3-partite), the segments usually filiform, equal or unequal. Lip continuous with the column, often shortly adnate to it, produced at the base into a short or elongated spur; limb spreading or pendulous, narrow or broad, undivided, or 3-lobed, or 3-partite. Column continuous with the ovary, not reclinate, short, footless; anther-cells parallel or diverging, forming with the side arms of the rostellum channels or tubes for the caudicles of the pollinia; pollinia granular, with short elongate caudicles and an exserted naked gland; stigma 2-lobed or extended into 2 short or elongate often clavate papillose processes; rostellum 3-lobed, the mid-lobe narrowly triangular, hidden between the anther-cells. Capsule ellipsoid or oblong, sometimes beaked.—DISTRIB. Species about 400, widely diffused through tropical and subtropical regions.

Petals 2-partite; lip 3-lobed or 3-partite.
Sepals with filiform tips ..... 1. *H. stenopetala.*
Sepals acute but not filiform at the tips.
Lower segment of petals shorter than the upper; pedicels very short or 0; stem leafy upwards ..... 2. *H. digitata.*
Lower segment of petals longer than the upper; pedicels long; stem with leaves at the base only.
Leaves more than one, linear, oblong or lanceolate, narrowed and sheathing at the base; upper segment of petals longer than broad ... 3. *H. rariflora.*
Leaf solitary, subrotund; upper segment of petals as broad as long ..... 4. *H. grandiflora.*

Petals entire.
Side lobes of lip petaloid, broader than the midlobe.
Lip deeply 3-lobed or 3-partite, not or hardly longer than the lateral sepals.
Side lobes of lip small, rounded ..... 5. *H. platyphylla.*
Side lobes of lip large, obliquely truncate and denticulate at the apex..... 6. *H. suaveolens.*
Lip deeply 3-lobed or 3-partite, much longer than the lateral sepals.
Lobes of lip with long filiform tails ..... 7. *H. crinifera.*
Lobes of lip not tailed.
Spur reaching 4 in. long; lateral sepals ½ in. long ..... 8. *H. longecalcarata.*
Spur 1¼ in. long; lateral sepals ½ in. long ... 9. *H. plantaginea.*
Side lobes of lip not broader than the midlobe.
Tubes of the anther-cells long; lateral sepals very gibbous with many arched nerves; stem leafy upwards ..... 10. *H. commelinifolia.*
Tubes of the anther-cells short.
Stem leafy upwards.
Bracts large, cucullate; flowers secund.
Leaves 1½ in. long; spur subacute; flowers greenish-yellow ..... 11. *H. Heyneana.*
Leaves 2 in. long; spur subobtuse; flowers white ..... 12. *H. subpubens.*
Leaves 3–6, clustered towards the middle or at the base of the stem.
Bracts as long as or longer than the ovary; lateral segments of lip narrower than the central linear segment.
Spur not longer than the ovary; lateral segments of lip slender but not filiform, scarcely or not longer than the midlobe.
Spur slender, incurved; leaves green throughout, placed near the middle of the stem ..... 13. *H. affinis.*
Spur stout, clavate; leaves with narrow yellowish margins, placed near the base of the stem ..... 14. *H. marginata.*
Bracts much shorter than the ovary; spur slightly exceeding the ovary, thickened below; leaves green throughout, placed near the base of the stem ..... 15. *H. viridiflora* var. *Dalzellii.*
Leaves 2 (rarely 3), radical or opposite on the stem, broadly ovate or suborbicular, cordate at the base.
Plant 8–18 in. high; bracts ⅛–⅜ in. long; lateral lobes of lip shorter than the midlobe ..... 16. *H. crassifolia.*
Plant 4–10 in. high; bracts ¼ in. long; lateral lobes of lip longer than the midlobe ..... 17. *H. diphylla.*

1. **Habenaria stenopetala,** *Lindl. Gen. & Sp. Orchid.* (1835) p. 319 (*not* p. 324). Stem 1–2 ft. high, stout, the lower portion clothed with closely appressed sheaths. Leaves in the middle part of the stem, 3–8 by 1–2 in., membranous, oblong-lanceolate or ovate-lanceolate, acute, the margins undulate, base narrowed or broad, amplexicaul or sheathing, the upper part of the stem between the leaves and the raceme with lanceolate acuminate bract-like leaves much smaller than those of the middle stem. Flowers arranged in many-flowered racemes 3–6 in. long, variable in size, the sepals and petals greenish, the lip brown; floral bracts lanceolate, acuminate, about as long as the slender stalked ovary. Sepals subequal; lateral sepals $\frac{3}{8}$–$\frac{1}{2}$ in. long, reaching $\frac{1}{6}$ in. broad, oblong-lanceolate, somewhat oblique, strongly 3-nerved, and with a long filiform apical tail; dorsal sepal similar. Petals shorter than the sepals, 2-partite, the segments linear, acute, usually unequal. Lip 3-partite, the segments variable, the lateral segments sometimes as long as the middle one but usually shorter than it; spur as long as or longer than the ovary, 2-ridged, slender, turned upwards. Column stout; anther-cells rather distant, parallel, narrow, erect, their tubes long; pollinia oblong; caudicles slender, twice as long as the pollinia; glands minute. Staminodes ovate, rugulose, situated externally to the anther-cell and stigma on each side. Stigmas 2, oblong, with slightly divergent blunt apices, situated below the anthers and at the margins of the mouth of the spur. Capsules linear-oblong, $\frac{1}{2}$–$\frac{2}{3}$ in. long. Fl. B. I. v. 6, p. 134; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 358; King & Pantling, in Ann. Roy. Bot. Gard. Calc. v. 8 (1898) p. 308, t. 404; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1030. ? *Habenaria modesta,* Dalz. in Kew Journ. Bot. v. 2 (1850) p. 262; Dalz. & Gibs. p. 267.

Rare. KONKAN: *Dalzell!, Law!, Stocks,* 64! S. M. COUNTRY: Párva Ghát, *Dalzell,* 15!—DISTRIB. India (Upper Assam, Bengal, W. Peninsula).

2. **Habenaria digitata,** *Lindl. Gen. & Sp. Orchid.* (1835) p. 307. Stem 1–2 ft. high, leafy, the lower part with closely appressed sheaths. Leaves variable, 2–4$\frac{1}{2}$ by $\frac{3}{4}$–1$\frac{1}{4}$ in., ovate-oblong, acute or acuminate, sheathing at the base. Flowers greenish-white, in cylindric, many-flowered, rather lax racemes; bracts large, lanceolate, acute, often foliaceous; pedicels very short. Sepals greenish-white; lateral sepals $\frac{1}{2}$ by $\frac{1}{4}$ in., ovate, acute, subfalcate, spreading; dorsal sepal $\frac{1}{2}$ by $\frac{1}{3}$ in., broadly elliptic or suborbicular, obtuse, 3-nerved. Petals 2-partite; upper segment $\frac{1}{2}$ by $\frac{1}{10}$ in., subfalcate, acute, 3-nerved; lower segment shorter, narrowly linear, acute, the segments separated by a rather wide sinus. Lip 3-partite, the segments linear, the lateral usually shorter than the middle one, which is about $\frac{1}{2}$ in. long; spur reaching $\frac{3}{4}$ in. long, equalling the ovary or nearly so, subclavate at the tip, with an erect ligule at the mouth. Stigmatic processes clavate-oblong, appressed to the lip. Anther-cells parallel, the tubes upcurved; rostellum shorter than the anther, obtusely triangular. Fl. B. I. v. 6, p. 134; Dalz. & Gibs. p. 267; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 270; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519; Prain, Beng. Pl. p. 1030. *Habenaria Gibsoni,* Hook. f. Fl. B. I. v. 6 (1890) p. 135; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *H. trinervia,* Wight, Icon. v. 5, part 1 (1852) p. 12, t. 1701.—Flowers: July.

KONKAN: *Stocks!*, *Law!*; Island of Karanja, *Dalzell & Gibson.* DECCAN: Lanoli, *Woodrow*; Khandala, *Cooke!*, *Bhiva!*, *Woodrow*; Purandhar, *Dr. Barnes!* KANARA: *Law!*—DISTRIB. India (Kashmir, Assam, Silhet, Bengal, Tenasserim, W. Peninsula).

VAR. *foliosa*, Hook. f. Fl. B. I. v. 6 (1890) p. 135. A smaller plant 6–12 in. high, all its parts smaller. Leaves 2 by 1 in. Racemes dense-flowered. Lateral sepals $\frac{5}{16}$ by $\frac{1}{8}$ in.; dorsal sepal $\frac{1}{4}$ by $\frac{1}{5}$ in. Upper segment of petals $\frac{1}{3}$ by $\frac{1}{20}$ in. Lip $\frac{3}{8}$ in. long; spur $\frac{5}{8}$ in. long. *Habenaria foliosa* (sp.), A. Rich. in Ann. Sc. Nat. sér. 2, v. 15 (1841) p. 71; Dalz. & Gibs. p. 267; Wight, Icon. t. 1700; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 273. *H. laciniata*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 261.—Flowers: July.

Rare in the Bombay Presidency. I have only seen 1 specimen collected on the hills about Kadakvasla near Poona; there are no specimens in Herb. Kew. Dalzell & Gibson mention the occurrence of the plant in Salsette, but there are no specimens in Dalzell's herbarium. I have followed Sir J. Hooker in making the plant a variety of *H. digitata*, from which it differs chiefly in the size of all its parts. Kraenzlin (*l. c.*) restores it to specific rank. In his clavis (p. 261) Kraenzlin gives as a distinguishing character the lengths of the petal-segments, which in the key he declares to be equal. In his description, however (p. 273), he describes the lower segments as shorter than the upper, which is correct.

3. **Habenaria rariflora,** *A. Rich. in Ann. Sc. Nat.* sér. 2, v. 15 (1841) p. 70, t. 2, D. Whole plant 2–10 in. high. Leaves radical or subradical, variable, $2\frac{1}{2}$–4 by $\frac{3}{8}$–1 in., linear-oblong or lanceolate, acute, sometimes complicate. Flowers white, 1–3 in short racemes; bracts ovate, acuminate, $\frac{5}{8}$–1 in. long; pedicels erect, about as long as the ovary and together with it reaching sometimes 2 in. long. Sepals 5-nerved; lateral sepals rather more than $\frac{3}{8}$ in. long by $\frac{1}{5}$ in. broad, ovate-oblong, acute, subfalcate; dorsal sepal $\frac{3}{8}$ by $\frac{1}{4}$ in., broadly ovate, subacute. Petals 2-partite; upper segments $\frac{1}{3}$ by $\frac{1}{6}$ in., ovate, acuminate, oblique, 3–4-nerved; lower segments longer than the upper, linear, acute. Lip $\frac{1}{2}$ in. long, 3-partite; lateral segments filiform, longer than the broader linear obtuse middle one; spur longer than the ovary, often exceeding 2 in. in length, upcurved. Anther large, apiculate, the cells parallel, the tubes short, upcurved; glands of pollinia orbicular; rostellum erect, slender. Stigmatic processes clavate. Fl. B. I. v. 6, p. 136; Dalz. & Gibs. p. 268; Wight, Icon. t. 924; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 271; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Habenaria uniflora*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 344.—Flowers: July–Aug.

KONKAN: *Stocks!*, *Law!*, *Dalzell!* DECCAN: Panchgani, *Cooke!*; Karkala (near Poona), *Woodrow*; Purandhar, *Dr. Barnes!*, *Woodrow.*—DISTRIB. India (W. Peninsula).

4. **Habenaria grandiflora,** *Lindl. in Wall. Cat.* (1828) 7032. Whole plant 3–8 in. high. Leaf radical, solitary, 1–2 in. long and as broad or nearly as broad as long, broadly ovate or suborbicular, often acute or apiculate at the apex, base cordate; petiole 0. Flowers white, in 1–4-flowered lax racemes; scape with one or two sheaths, together with the raceme 3–8 in. high; bracts $\frac{1}{2}$ in. or more long, ovate, acuminate; pedicels about as long as the ovary, both together 1–2 in. long. Lateral sepals $\frac{3}{5}$ by $\frac{1}{5}$ in., obliquely ovate, acute, 7-nerved; dorsal sepal $\frac{1}{3}$ by $\frac{1}{5}$ in., ovate, cucullate, obtuse, apiculate. Petals 2-partite; upper segment very broad, $\frac{1}{4}$ by $\frac{1}{4}$ in., obliquely ovate or suborbicular; lower segment $\frac{3}{5}$ in. long, filiform. Lip $\frac{1}{2}$ in. long, 3-partite,

the segments subequal; lateral segments filiform; middle segment $\frac{1}{16}$ in. broad, linear-lanceolate, acute; spur $\frac{3}{4}$ in. long, curved, longer than the ovary, clavate at the tip. Anther 3-cuspidate, the cells parallel, the tubes rather short, broad, spreading; gland of pollinia large, orbicular. Stigmatic processes large, clavate. Rostellum elongate, erect. Fl. B. I. v. 6, p. 136; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 337; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 519. *Habenaria rotundifolia*, Lindl. Gen. & Sp. Orchid. (1835) p. 306; Dalz. & Gibs. p. 267.—Flowers: July.

KONKAN: *Stocks*!, *Law*! DECCAN: Máwal (Poona districts), *Stocks*!; Shivapur, *Cooke*!; Mahableshwar, *Cooke*!, *Stocks*!, *H. M. Birdwood*; Sinhagad (near Poona), *Woodrow*; Purandhar, *Woodrow*. S. M. COUNTRY: Belgaum, *Stocks*!—DISTRIB. India (W. Peninsula).

The tubers furnish the *Salep misri* of Indian bazaars.

5. **Habenaria platyphylla,** *Spreng. Syst. Veg.* v. 3 (1826) p. 690. Whole plant 6–18 in. high. Leaves 3–6, lying flat on the ground, fleshy, 2–4 in. long and as broad or nearly as broad as long, sessile, orbicular or elliptic. Flowers white, fragrant, in dense-flowered short spikes; scape together with spike 6–18 in. long, the scape with numerous erect lanceolate-subulate sheaths up to the spike; bracts lanceolate, acute, shorter than the long-beaked ovary. Lateral sepals $\frac{3}{8}$ by $\frac{1}{4}$ in., obliquely ovate, obtuse; dorsal sepal rather more than $\frac{1}{4}$ in. long by $\frac{1}{5}$ in. wide, broadly elliptic, obtuse. Petals $\frac{1}{6}$ by $\frac{1}{16}$ in., linear, subacute. Ovary 1 in. long with a slender beak as long as the body. Lip nearly $\frac{1}{3}$ in. long, veined; side lobes $\frac{1}{10}$ by $\frac{1}{10}$ in., rounded; midlobe $\frac{1}{5}$ in. long, triangular, acute; spur $1\frac{1}{3}$–$1\frac{1}{2}$ in. long, clavate at the apex, the mouth funnel-shaped, with a short tooth. Anther-cells divergent; tubes long; glands of the pollinia small. Stigmatic processes subglobose. Rostellum short, triangular. Fl. B. I. v. 6, p. 140; Grah. Cat. p. 201; Wight, Icon. t. 1709; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 411; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520.—Flowers: Aug.–Sept.

KONKAN: *Dalzell*!, *Stocks*!, *Law*! S. M. COUNTRY: Belgaum, *Ritchie*, 76!; Dharwar, *Woodrow*.—DISTRIB. India (W. Peninsula).

6. **Habenaria suaveolens,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 263. Whole plant 8–12 in. high; stem short, clothed at the base below the leaves with a few old sheaths. Leaves 3–5, arising about 1 in. or so above the ground, 3–6 by $\frac{1}{4}$–$\frac{5}{8}$ in., linear-oblong or linear-lanceolate, acute or acuminate. Flowers fragrant, in few-flowered secund lax racemes; bracts $\frac{1}{2}$–$\frac{3}{4}$ in. long, ovate-lanceolate, finely acuminate, exceeding the very shortly pedicellate ovary; peduncles with raceme 4–10 in. long. Lateral sepals $\frac{1}{3}$ by $\frac{1}{6}$ in., triangular-oblong, acute, subfalcate; dorsal sepal $\frac{1}{3}$ by $\frac{1}{5}$ in., ovate, acute. Lip $\frac{3}{8}$ in. long; side lobes $\frac{1}{5}$ in. broad, obliquely truncate and denticulate at the apex; midlobe a little longer than the side lobes, $\frac{1}{10}$ in. broad, linear-spathulate, acute; spur $\frac{3}{8}$ in. long, about equalling the ovary, subclavate at the apex. Anther-tubes 0; pollinia clavate, as long as their stout caudicles; glands large, orbicular. Stigmatic processes very short. Fl. B. I. v. 6, p. 140; Dalz. & Gibs. p. 268; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 416; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520.

KONKAN: *Dalzell*!; between Vingorla and Malwán, rare, *Dalzell & Gibson*, *Woodrow*.—DISTRIB. India (W. Peninsula).

7. **Habenaria crinifera,** *Lindl. Gen. & Sp. Orchid.* (1835) p. 323. Whole plant 3–18 in. high; stem short, leafy near the base. Leaves 2–6 by $\frac{3}{8}$–$1\frac{1}{2}$ in., oblong-lanceolate, acuminate, spreading, broadly sheathing below. Flowers in short racemes 2–3 in. long; peduncles 2–15 in. long, with large distant lanceolate-subulate sheaths; bracts reaching $\frac{1}{2}$ in. long, ovate-lanceolate, acuminate; ovary beaked, together with beak and pedicel reaching 1 in. long. Sepals greenish; lateral sepals $\frac{1}{3}$ by $\frac{1}{6}$ in., obliquely ovate, subacute; dorsal sepal $\frac{1}{4}$ in. long and nearly as broad as long, orbicular-ovate, acute. Petals white, erect, linear, acute. Lip white, 3 times as long as the sepals, with a long claw, 3-lobed; side lobes cuneiform, the outer margin toothed and with a slender tail as long as itself produced from the inner margin; midlobe clawed, cleft into 2 lanceolate long-tailed segments as long as the side lobes; spur $1\frac{1}{4}$–$1\frac{1}{2}$ in. long, slender, incurved, the mouth with a strong ligule. Anther-tubes long, straight; caudicles of pollinia winged; glands very small. Stigmatic processes clavate, adnate to the mouth of the spur. Rostellum very short, obtuse. Capsules 1–$1\frac{1}{2}$ in. long, fusiform, with a slender beak. Fl. B. I. v. 6, p. 142; Dalz. & Gibs. p. 269; Wight, Icon. t. 926; Trim. Fl. Ceyl. v. 4, p. 229; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 424. *Habenaria schizochilus,* Grah. Cat. Bo. Pl. (1839) p. 252.

Not common. KONKAN: Vingorla, *Dalzell & Gibson, Woodrow.* S. M. COUNTRY: Rámghát, *Law* ex *Graham, Dalzell* ex *Stocks,* 5!—DISTRIB. India (W. Peninsula).

8. **Habenaria longecalcarata,** *A. Rich. in Ann. Sc. Nat.* sér. 2, v. 15 (1841) p. 71, t. 3, B. Whole plant 12–20 in. high or even more; stem short, leafy near the base. Leaves 3–5, oblong or oblong-lanceolate, variable in size, $1\frac{3}{4}$–4 by $\frac{3}{4}$–$1\frac{1}{4}$ in. Flowers white, jasmine-scented, few (1–4), in short lax racemes; bracts 1 in. long, convolute round the pedicels, acute; pedicels in fruit reaching $1\frac{1}{2}$ in. long. Lateral sepals $\frac{1}{2}$ by $\frac{1}{4}$ in., obliquely ovate, subacute; dorsal sepal $\frac{7}{16}$ by $\frac{1}{4}$ in., elliptic, obtuse. Petals exceeding $\frac{3}{8}$ in. long, oblong, subfalcate, subobtuse. Lip $\frac{3}{4}$ in. long or longer, with a claw $\frac{1}{5}$ by $\frac{1}{8}$ in., 3-lobed beyond the claw; side lobes $\frac{5}{8}$ in. long by $\frac{1}{10}$ in. broad at the base, linear, becoming broader outwards, obliquely cut to a fine point at the apex and toothed on the outside; midlobe $\frac{3}{8}$ by $\frac{1}{10}$ in., linear, acute; spur often reaching 4 in. long, thickened from below the middle towards the tip. Anther-tubes long, slender; pollinia narrowly pyriform, shorter than the caudicles, which are narrowly winged on one side. Stigmatic processes thick, surrounding the mouth of the spur. Rostellum obscure. Fl. B. I. v. 6, p. 141; Dalz. & Gibs. p. 268; Wight, Icon. t. 925; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 418; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520. *Habenaria longicorniculata,* Grah. Cat. Bo. Pl. (1839) p. 202.—Flowers: Sept.–Oct.

KONKAN: *Nimmo* ex *Graham, Jacquemont,* 598!; common on the Ghâts, *Stocks,* 22! DECCAN: *Woodrow*; Purandhar, *Kanitkar!*; Bhor Ghát, *Cooke!*; Khandala, *Cooke!*, *Woodrow, Graham.* S. M. COUNTRY: near Belgaum, abundant, *Dalzell & Gibson.*—DISTRIB. India (W. Peninsula).

9. **Habenaria plantaginea,** *Lindl. Gen. & Sp. Orchid.* (1835) p. 323. A slender herb 8–12 in. high; tubers oblong. Leaves radical,

3–6 by ¾–1½ in., elliptic or elliptic-oblong, acute, spreading, membranous, narrowed at the base into a short sheath. Flowers pure white, subsecund, in lax spikes 3–5 in. long; scapes 5–6 in. long, with many distant open lanceolate acuminate sheaths ½–1 in. long; bracts ⅜–½ in. long, ovate-lanceolate, finely acuminate, much shorter than the beaked ovary. Sepals strongly 3-nerved; lateral sepals ⅕ by $\frac{1}{10}$ in., falcately oblong, subacute; dorsal sepal ⅕ by ⅛ in., ovate-oblong. Petals ⅛ by $\frac{1}{20}$ in., linear-lanceolate, acute. Lip $\frac{7}{16}$ in. long by about ⅜ in broad, flabelliform from a narrow claw, many-nerved, 3-lobed, puberulous; lateral lobes half-ovate, ¼ by ⅛ in., subacute; midlobe nearly but not quite as long and only half as broad as the lateral, linear, acute; spur 1¼ in. long, equal to or longer than the ovary, pendulous. Anther-tubes short, upcurved; pollinia pyriform, as long as their broad caudicles, which are inserted upon an (at first apparently simple) entire lanceolate concave gland, which afterwards divides longitudinally, each pollinia carrying away one half. Stigmatic processes large, clavate. Rostellum triangular, broad. Capsule ⅔ in. long, turgidly fusiform, curved, with a short slender beak. Fl. B. I. v. 6, p. 141; Wight, Icon. t. 1710; Trim. Fl. Ceyl. v. 4, p. 229; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 413; Prain, Beng. Pl. p. 1030.—Flowers: Mar.–Apr.

KONKAN: *Dalzell!*; Matheran, *H. M. Birdwood.* DECCAN: Ambenala Ghát near Lanoli, *Kanitkar!*—DISTRIB. India (Subtropical Himalaya, Behar, Central India, W. Peninsula); Ceylon.

10. **Habenaria commelinifolia,** *Wall. ex Lindl. Gen. & Sp. Orchid.* (1835) p. 325. Stem 2–3 ft. high, with sheaths at the base, leafy upwards, the leaves becoming gradually smaller, passing into lanceolate caudate-acuminate bract-like sheaths below the spike; tubers ellipsoid. Leaves 3–6 by ¾–1¼ in., oblong or oblong-lanceolate, flat, sheathing at the base. Flowers sessile, white, inodorous, in spikes 4–8 in. long; bracts 1 in. long, lanceolate, produced to a fine acicular point, exceeding the body of the ovary without the beak. Lateral sepals nearly ½ in. long, very gibbous, hatchet-shaped, beaked, with many arched nerves; dorsal sepal ⅜ in. long, orbicular, shortly beaked, hooded. Petals ⅓ by ⅕ in., obliquely ovate-oblong, obtuse. Lip linear for about ⅕ in. from the base, $\frac{1}{10}$ in. broad, then divided into 3 segments, of which the lateral are filiform and exceed 1 in. long, the middle segment ⅝ by $\frac{1}{10}$ in., linear, shorter than the lateral; spur 1½–2½ in. long, incurved, green, with a funnel-shaped mouth. Anther-tubes long, straight, erect. Stigmatic processes large, clavate, incurved. Rostellum short, triangular. Capsules sessile, fusiform, 1½ in. long including the curved beak which is twice as long as the body of the capsule. Fl. B. I. v. 6, p. 143; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 322; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Prain, Beng. Pl. p. 1031. *Orchis commelinifolia,* Roxb. Fl. Ind. v. 3 (1832) p. 451; Grah. Cat. p. 201.—Flowers: Sept.

KONKAN: *Stocks!*, *Law!*, *Dalzell!*; S. Konkan in pasture-lands, *Graham.* DECCAN: Khandala, *Woodrow.* — DISTRIB. India (Tropical W. Himalaya, Bengal, Birma, W. Peninsula).

11. **Habenaria Heyneana,** *Lindl. Gen. & Sp. Orchid.* (1835) p. 320. Whole plant scarcely reaching 10 in. high; stem stout, leafy.

Leaves turning black in drying, subimbricate, 1–1½ by ¼–⅝ in., sheathing, ovate, acute, erect or recurved, soon reduced upwards to smaller bract-like leaves. Flowers greenish-yellow, few, secund, in terminal spikes; bracts imbricating, the lower reaching 1 in., the upper ¾ in. long, ovate, finely acuminate, cucullate, exceeding the flowers. Lateral sepals ¼ by $\frac{1}{10}$ in., obliquely ovate, straight on the upper, rounded on the lower edge, obtuse or subacute; dorsal sepal ⅕ by ⅛ in., ovate, subobtuse. Petals ⅕ by $\frac{1}{20}$ in., linear, acute, falcate. Lip thick, ¼ in. long, 3-lobed at the apex, with a basal claw $\frac{1}{16}$ by $\frac{1}{16}$ in.; side lobes $\frac{1}{10}$ by $\frac{1}{30}$, linear, subacute; midlobe oblong, rounded at the apex, ⅛ by $\frac{1}{12}$ in.; spur ⅜ in. long, subclavate at the tip, shorter than the sessile not beaked ovary. Anther-tubes 0; caudicles of pollinia very short, stout; gland large, orbicular. Stigmatic processes large, spreading, clavate. Rostellum short, triangular, acute. Fl. B. I. v. 6, p. 148; Dalz. & Gibs. p. 268; Wight, Icon. t. 923; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 375; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520.—Flowers: Aug.–Sept.

KONKAN: *Law*!, *Dalzell*!; S. Konkan, *Dalzell* ex *Stocks*, 78!; Southern Ghâts, *Stocks*, 12!; Wari country, *Dalzell & Gibson*. DECCAN: *Stocks*, 60!; Lanoli, *Woodrow*. KANARA: Sirsi, *Dalzell*!—DISTRIB. India (W. Peninsula).

12. **Habenaria subpubens,** *A. Rich. in Ann. Sc. Nat.* sér. 2, v. 15 (1841) p. 75, t. 4, C. Whole plant 6–12 in. high; stem slender, leafy. Leaves 2 by ⅜ in., smaller upwards and passing into bracts, sheathing at the base, linear-lanceolate, acute, apiculate. Flowers white, secund, pedicellate, in slender racemes 1½–4 in. long; bracts ½–⅝ in. long, ovate-lanceolate, acute, apiculate, cucullate; pedicels with ovary ⅝ in. long. Lateral sepals ¼ by $\frac{1}{12}$ in., oblong, acute; dorsal sepal ¼ by ⅛ in., ovate, obtuse. Petals ¼ by $\frac{1}{16}$ in., falcate. Lip ¼ in. long with a claw $\frac{1}{16}$ by $\frac{1}{16}$ in., 3-lobed beyond the claw; side lobes linear, subfalcate, $\frac{1}{25}$ in. broad, rather shorter than the midlobe; midlobe $\frac{1}{12}$ in. broad, fleshy, elliptic, subobtuse; spur ⅜ in. long, linear, subobtuse. Anther apiculate. Stigmatic processes adnate to the claw. Fl. B. I. v. 6, p. 148; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 361; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520. *Habenaria candida*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 262; Dalz. & Gibs. p. 267. Scarcely distinct from *H. Heyneana*.

KONKAN: *Dalzell*!; S. Konkan, *Dalzell & Gibson*. DECCAN: Karli near Khandala, *Jacquemont*, 619! S. M. COUNTRY: Dharwar, *Law* ex *Stocks*, 79!—DISTRIB. India (W. Peninsula).

13. **Habenaria affinis,** *Wight, Icon.* v. 5, part 1 (1852) p. 13, t. 1707 (*not* of Don). Stem stout, 1–2 ft. high, with several sheaths at the base. Leaves 3–6, clustered near the middle of the stem, 4–6 by 1–2 in., elliptic-lanceolate, acuminate, sheathing at the base. Flowers in long cylindric racemes 6 in. or more long; peduncle of raceme bearing several lanceolate finely acuminate sheaths above the leaves; bracts ½ in. long, ovate-lanceolate, caudate-acuminate, longer than the curved, very shortly pedicellate, shortly beaked ovary. Lateral sepals ⅕ by $\frac{1}{12}$ in., oblong-lanceolate, acute; dorsal sepal ⅕ by $\frac{1}{10}$ in., ovate, acute. Petals ⅕ in. long, similar to the lateral sepals. Lip with a claw $\frac{1}{16}$ in. long and broad, 3-lobed beyond the claw; side lobes ⅓ in. long by

$\frac{1}{30}$ in. broad at base, tapering to a fine point; midlobe nearly $\frac{1}{4}$ in. long by $\frac{1}{16}$ in wide, linear, subacute; spur $\frac{1}{3}$ in. long, slender, much curved, acute. Anther-tubes shortly upcurved. Stigmatic processes large, clavate. Fl. B. I. v. 6, p. 149; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 324; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Prain, Beng. Pl. p. 1031.

DECCAN: Purandhar, *Woodrow*. S. M.. COUNTRY, Belgaum, *Ritchie*, 17!—DISTRIB. India (Bengal, Central India, W. Peninsula).

14. **Habenaria marginata,** *Coleb. in Hook. Exot. Fl.* (1825) t. 136. Whole plant 4–10 in. high. Leaves few (often 3), subradical, sessile, 2–4 by $\frac{1}{2}$–1 in., oblong, obtuse, with yellow or white margins, reduced upwards to lanceolate finely acuminate sheaths $\frac{1}{2}$–1 in. long. Flowers yellow, sessile, numerous, in cylindric spikes $1\frac{1}{2}$–3 in. long; bracts $\frac{1}{2}$–$\frac{3}{4}$ in. long, ovate-lanceolate, finely acuminate, about equalling the sessile ovary. Sepals 5-nerved; lateral sepals rather less than $\frac{1}{3}$ in. long and $\frac{1}{10}$ in. broad, obliquely oblong, acute; dorsal sepal $\frac{1}{4}$ by $\frac{1}{5}$ in., broadly ovate, acute, cucullate. Petals $\frac{1}{5}$ in. long, oblong-lanceolate, acute, falcate from a broad base, closely appressed to the dorsal sepal. Lip nearly $\frac{1}{2}$ in. long, with a claw $\frac{1}{20}$ in. long and broad, 3-lobed beyond the claw; side lobes acute, 1-nerved; midlobe rather more than $\frac{1}{4}$ in. long, and $\frac{1}{12}$ in. broad, lanceolate, subobtuse, 3-nerved; spur nearly $\frac{1}{2}$ in. long, stout, curved, clavate at the tip. Anther-tubes short, spreading, funnel-shaped. Stigmatic processes elongate, adnate to the lip. Rostellum triangular, acute. Capsules $\frac{1}{2}$ in. long, fusiform, turgid, curved, obscurely beaked. Fl. B. I. v. 6, p. 150; Grah. Cat. p. 201; Dalz. & Gibs. p. 268; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 360; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Prain, Beng. Pl. p. 1031.—Flowers: Aug.

KONKAN: *Law*!, *Dalzell*!; S. Konkan, *Nimmo* ex *Graham*, *Stocks*, 6!; Karanja, *Dalzell & Gibson*; Uran (island in Bombay Harbour), *Dalzell*! DECCAN: Junnar near Poona, *Dalzell & Gibson*, *Stocks*, 59!; Purandhar, *Woodrow*.—DISTRIB. India (W. Himalaya, Behar, Bengal, Birma, W. Peninsula).

VAR. *flavescens*. A more slender plant; flowers fewer; ovary more distinctly beaked. *Habenaria flavescens* (sp.), Hook. f. Fl. B. I. v. 6 (1890) p. 150.

KONKAN; *Law*!

There is but 1 sheet in Herb. Kew., the specimens on which seem to have been drawn up by growing in the shade. I can discover no characters which would entitle the plant to the rank of a species. Indeed Sir J. Hooker (*l. c.*) was of opinion that it was probably a form of *H. marginata*.

15. **Habenaria viridiflora,** *R. Br.* VAR. **Dalzellii,** *Hook. f. Fl. B. I.* v. 6 (1890) p. 150. Whole plant 4–14 in. high; stem below the leaves very short. Leaves 3–5, arising near the base of the stem, 1–3 by $\frac{1}{16}$–$\frac{3}{16}$ in., linear, acute or acuminate, often apiculate. Flowers yellow, in many-flowered rather lax racemes $1\frac{1}{2}$–3 in. long, on long very slender wiry peduncles clothed with many ovate-lanceolate, finely acuminate sheaths; bracts $\frac{1}{6}$–$\frac{1}{5}$ in. long, shorter than the shortly pedicellate ovaries (which with the pedicels reach $\frac{1}{2}$ in. long), ovate-lanceolate, finely acuminate. Lateral sepals $\frac{1}{6}$ by $\frac{1}{12}$ in., obliquely ovate, subobtuse, strongly nerved; dorsal sepal $\frac{1}{10}$ by $\frac{1}{16}$ in., ovate, subacute. Petals $\frac{1}{8}$ by

$\frac{1}{12}$ in., obliquely ovate, subobtuse. Lip $\frac{1}{4}$ in. long, 3-partite almost to the base; side lobes $\frac{1}{5}$ by $\frac{1}{36}$ in., linear, acuminate, recurved; midlobe shorter than the side lobes, $\frac{1}{36}$ in. broad, linear, subacute; spur $\frac{5}{8}$ in. long, slightly thickened towards the acute tip, incurved, exceeding the ovary. Anther-tubes short, upcurved; pollinia pyriform; caudicles short. Stigmatic processes long, clavate. Rostellum short, broad. Capsules together with pedicel exceeding $\frac{1}{2}$ in. long, fusiform, hardly beaked. *Habenaria viridiflora*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520 (*not* of Br.). *Cœloglossum luteum*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 263; Dalz. & Gibs. p. 269.—Flowers: Aug.

It is the above variety and not the type which seems to occur in the Bombay Presidency; at least this is the plant which is represented from that Presidency in Herb. Kew., and I have seen no others. It is apparently a rare plant.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks*, 36!; Málwan, *Dalzell & Gibson*.—DISTRIB. India (W. Peninsula).

16. **Habenaria crassifolia,** *A. Rich. in Ann. Sc. Nat.* sér. 2, v. 15 (1841) p. 72, t. 3, C. Whole plant 8–18 in. high. Leaves 2 or 3, radical, fleshy, variable in size and shape, 1–4½ by 1–2½ in., broadly ovate, acute, or suborbicular, or sometimes subreniform and broader than long, base cordate. Flowers white, in elongated many-flowered racemes 3–6 in. long; scape with many finely acuminate sheaths; bracts ½–¾ in. long, ovate-lanceolate, caudate-acuminate; pedicels together with beaked ovary reaching nearly ¾ in. long. Sepals rather less than ¼ in. long by ⅛ in. broad; lateral sepals oblong, obtuse, with 3 strong nerves and usually weaker ones; dorsal sepal elliptic, obtuse, with 3 very strong nerves. Petals ⅛ by $\frac{1}{10}$ in., ovate, acute, with a strong midrib and 2 small weak lateral nerves. Lip ⅕ in. long, 3-lobed; lobes linear-lanceolate, subacute, $\frac{1}{16}$ in. broad, the lateral lobes usually slightly shorter than the midlobe; spur ⅔ in. long, green. Anther-tubes short, spreading. Stigmatic processes short. Rostellum small, erect. Fl. B. I. v. 6, p. 151; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Kraenzlin, Orchid. Gen. & Sp. v. 1 (1897) p. 344. *Platanthera brachyphylla*, Lindl. Gen. & Sp. Orchid. (1835) p. 293; Wight, Icon. t. 1694; Dalz. & Gibs. p. 269.—Flowers: Sept.

KONKAN: *Stocks*!, *Law*! DECCAN: Junnar Hill near Poona, *Stocks*, 77!; Mahableshwar, *Cooke*!, *Woodrow*, *H. M. Birdwood*; Purandhar, *Woodrow*.—DISTRIB. India (W. Peninsula).

17. **Habenaria diphylla,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 262. Whole plant 4–10 in high. Leaves 2, radical, pressing close on the ground, one of the pair usually smaller than the other, subfleshy, 1–2 in. in diam., orbicular with a short acumen, base cordate. Flowers greenish-white, in many-flowered racemes; scape with many ovate-lanceolate acuminate sheaths; bracts ¼ in. long, ovate, acuminate, shorter than the ovary; pedicels together with ovary ⅓–½ in. long. Lateral sepals $\frac{5}{16}$ by ⅛ in., ovate, acute, 3-nerved; dorsal sepal ¼ by ⅕ in., broadly ovate, subacute, cucullate, somewhat obscurely nerved. Petals as long as the lateral sepals, $\frac{1}{16}$ in. broad, linear, acute, subfalcate. Lip longer than the sepals, 3-partite; segments filiform, the lateral longer than the middle one; spur ½ in. long, inflated, acute. Anther-tubes

very short. Stigmatic processes elongate, clavate, adnate to the mouth of the spur. Rostellum obscure. Fl. B. I. v. 6, p. 151; Dalz. & Gibs. p. 268; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 346; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Prain, Beng. Pl. p. 1031. *Habenaria Jerdoniana*, Wight, Icon. v. 5, part 1 (1852) p. 14, t. 1715. *Liparis diphyllos*, Nimmo, in Grah. Cat. (1839) p. 252.

KONKAN: *Stocks*!, *Dalzell*!; S. Konkan, *Nimmo*, *Dalzell & Gibson*. KANARA: *Law*! —DISTRIB. India (W. Himalaya, Dacca (*C. B. Clarke*), W. Peninsula).

IMPERFECTLY KNOWN SPECIES.

HABENARIA CARANJENSIS, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 262; Dalz. & Gibs. Bo. Fl. p. 267. Lower leaves somewhat rounded, upper oblong-lanceolate, 3-nerved; bracts acuminate, shorter than the ovary; upper sepal rounded; petals half-ovate, obtuse; lip tripartite; middle division oblong, rather obtuse; lateral ones shorter, cuneate, truncate; spur clavate, shorter than the ovary; flowers small, yellow.

The above is the description given by Dalzell in the 'Bombay Flora' of Dalzell and Gibson. There are no specimens in Herb. Kew. and the plant does not appear to have been collected by any other botanist than Dalzell. Fl. B. I. v. 6, p. 166; Kraenzlin, Orchid. Gen. et Sp. v. 1 (1897) p. 365.

ORDER CXXVI. SCITAMINEÆ.

Herbs often large, frequently with a pseudo-stem of convolute leaf-sheaths (rarely with a woody caudex). Leaves radical or cauline, usually membranous; sheaths generally large, clasping the stem; lamina with a stong central nerve and pinnate close secondary nerves; petioles short or 0. Flowers hermaphrodite, rarely 1-sexual (*Musa*), irregular, solitary or spicate; bracts membranous or herbaceous; bracteoles membranous or 0. Perianth 2-seriate, superior; outer segments 3, calycine (rarely petaloid), free and imbricate, or connate in an entire, toothed or spathaceous tube; inner segments petaloid, connate in a long or short corolla-tube free or adnate to the petaloid staminodes; limb 3-partite, the segments free or connate. Stamens only 1 perfect, the rest replaced by petaloid staminodes, or 5 perfect with a sixth imperfect or obsolete; anthers linear, 2-celled (rarely of one cell on the margin of a petaloid connective). Ovary 3 (rarely 1 or 2) -celled, inferior; ovules many (rarely few), anatropous, axile (rarely parietal); style usually slender, with 2 short stylodes, crowning the ovary; stigma usually entire or subentire. Fruit a loculicidally 3-valved capsule, or indehiscent and membranous or fleshy, usually crowned by the remains of the perianth. Seeds often arillate; albumen floury; embryo small.—DISTRIB. Genera about 50; species very many, throughout the warmer regions of both hemispheres.

Stamen only 1 perfect, the others reduced to staminodes or wanting.
  Auther 2-celled; calyx tubular or spathaceous; style slender, embraced below the stigma by the anther.
    Ovary 1-celled; placentas 3, parietal; corolla-tube long; flowers yellow ..... 1. GLOBBA.
    Ovary 3-celled; placentas axile.
      Lateral staminodes broad.
        Connective not spurred at the base; corolla-tube long, slender.

Filament short; connective broad, crested; stigma turbinate ..... 2. KÆMPFERIA.
Filament long, complicate; connective broad, not crested; stigma turbinate ..... 3. HITCHENIA.
Filament long, narrow; connective very narrow, not crested; stigma subglobose ... 4. HEDYCHIUM.
Connective spurred at the base; corolla-tube funnel-shaped ..... 5. CURCUMA.
Lateral staminodes small or 0 (rarely narrow and adnate to the lip); corolla-tube cylindric.
Flowers in dense cone-like spikes.
Anther-cells divaricate, on a short arcuate filament, with or without a petaloid crest... 6. AMOMUM.
Anther-cells contiguous, parallel.
Filament short; connective produced into a narrow appendage as long as the anther; stigma small, subglobose; spikes usually produced direct from the rootstock ..... 7. ZINGIBER.
Filament forming with the produced connective an oblong petaloid process with the contiguous linear anther-cells placed in its middle; stigma with a semilunar pit ciliate round the margin; spikes usually at the top of leafy stems, rarely produced direct from the rootstock ..... 8. COSTUS.
Flowers in racemes or panicles at the top of leafy stems; filament long; anther-cells divergent at the apex; stigma subglobose ..... 9. ALPINIA.
Anther 1-celled, laterally adnate to a petaloid filament; calyx of free sepals..... 10. PHRYNIUM.
Stamens 5 perfect, the sixth imperfect or absent; stigma more or less distinctly 6-lobed..... 11. MUSA.

1. GLOBBA, Linn.

Herbs with creeping rhizomes and erect stems. Leaves oblong or oblong-lanceolate. Flowers in terminal panicles or spikes; bracts usually deciduous; buds often replaced by bulbils. Calyx funnel-shaped, 3-lobed. Petals 3, connate in a corolla with a tube longer than the calyx; corolla-lobes ovate, subequal. Stamen 1 perfect; filament long, incurved, with 2 dorsal appendages; anther oblong, the connective simple, winged, or spurred, produced beyond the cells; lateral staminodes petaloid, contiguous to the corolla-segments. Lip deflexed. Ovary 1-celled; ovules many, on 3 parietal placentas; style filiform, lying in a groove of the filament; stigma turbinate. Fruit a globose capsule, tardily dehiscent.—DISTRIB. East India, Malaya, China, Philippines, New Guinea; species 60 or 70.

1. **Globba bulbifera,** *Roxb. in As. Res.* v. 11 (1810) p. 358. Stems 8–24 in. high, slender, erect or drooping, crowded on a tufted rootstock; root of fleshy fibres. Leaves 3–7 by 1–1¾ in., few, elliptic-lanceolate or oblong-lanceolate, distichous, shortly petiolate, green above, paler and more or less puberulous beneath; midrib stout; sheath long, ciliate; ligule very short, ciliate. Flowers in lax spikes or racemes 2–3½ in. long, fragrant, sessile or very shortly pedicellate, the lower replaced by yellow ovoid bulbils ⅛–¼ in. long; bracts loose, elliptic-oblong, obtus

or subacute, the lower sometimes more than 1 in. long, becoming smaller upwards. Calyx ⅛–¼ in. long, funnel-shaped, 3-toothed. Corolla yellow; tube very slender, nearly ½ in. long; segments subequal, oblong, shorter than the tube. Lip deeply 2-fid, narrow, deflexed. Filament long, slender, incurved; anther-cells narrow, winged on both sides, the wings spreading, deeply 2-fid. Fruit ¼ in. long, oblong, terete, smooth. Fl. B. I. v. 6, p. 206; Trim. Fl. Ceyl. v. 4, p. 240; Prain, Beng. Pl. p. 1037; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 154. *Globba marantina*, Wall. Cat. 6532 (*not* of Linn.); Grah. Cat. p. 211; Dalz. & Gibs. p. 272; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520. *G. marantinoides*, Wight, Icon. v. 6 (1853) p. 15 (by error in t. 2001 *G. marantina*).—Flowers: Aug.

KONKAN: *Stocks*!, *Law*!; Wari country on Wag Donger, *Dalzell*! S. M. COUNTRY: Párva Ghát, *Ritchie*, 1440! KANARA: Yellapur, *Woodrow*.—DISTRIB. India (E. Himalaya, Bengal, W. Peninsula); Ceylon, Malay Islands, Timor.

IMPERFECTLY KNOWN SPECIES.

GLOBBA CANARENSIS, Baker, in Hook. f. Fl. B. I. v. 6 (1890) p. 206. Leaves small, thin, caudate; panicle few-flowered, lax, most of the flowers replaced by long narrow acuminate bulbils; calyx green, narrowly funnel-shaped, ⅛ in. long; corolla-tube more than twice as long as the calyx; corolla-segments oblong, ⅛ in. long; anthers not seen.

KANARA: *Law*!

GLOBBA PLATYSTACHYA, Baker, l. c. Leaves large and thin; panicle short, lax, and very broad, the lower branches 2–4 in. long, ending in a bulbil and bearing numerous close flowers shortly pedicellate towards the end, each subtended by a small persistent ovate acutely-keeled bract; calyx green, broadly funnel-shaped, $\frac{1}{12}$ in. long; corolla-tube 3 times the length of the calyx; corolla-segments oblong, yellow, ⅛–¼ in. long; anthers not seen.

KONKAN: *Law*!

The descriptions of these two species are taken from the original descriptions in the 'Flora of British India,' given by Mr. Baker. No fresh material has been sent to Kew, so that no further advance has been made there in the knowledge of the plants.

2. **KÆMPFERIA,** Linn. Gen. Pl. (1737) p. 331.

Herbs with short stems or stemless; rootstock often tuberous. Leaves few. Flowers spicate, on radical scapes or at the apex of the leafy stem. Calyx short, cylindric, splitting spathaceously. Petals 3, connate in a corolla with a long slender tube; corolla-lobes equal, usually spreading. Stamen 1 perfect; filament short, arcuate; anther 2-celled, the cells discrete, on a wide connective which is produced above into a petaloid crest, not spurred below; lateral staminodes broad, petaloid. Lip broad, usually 2-fid. Ovary 3-celled; ovules many on 3 axile placentas; style long, filiform; stigma turbinate. Fruit an oblong capsule with thin pericarp. Seeds subglobose, with a small lacerate aril.—DISTRIB. Species about 50, Indian and Malayan.

Stemless; spikes central, radical; anther-crest 2-lobed or 2-fid.
- Leaves rotund-ovate, spreading flat upon the ground; petioles short; lip deeply 2-fid ..... 1. *K. Galanga.*
- Leaves narrowed at the base, erect; petioles long; lip entire. 2. *K. pandurata.*

Leafy stem produced; spikes terminal; anther-crest entire, ciliate ..... 3. *K. scaposa.*

1. **Kæmpferia Galanga,** *Linn. Sp. Pl.* (1753) p. 2. Rootstock tuberous, aromatic; root-fibres fleshy, cylindric, not aromatic. Leaves 2, spreading horizontally, lying flat on the surface of the ground, 2½–5 by 1¾–3½ in., rotund-ovate, deltoid-acuminate, thin, deep green, 10–12-ribbed, the margins not thickened nor colored; petioles short, channelled. Flowers 6–12 from the centre of the plant between the leaves, fugacious, fragrant, opening successively; bracts lanceolate, green, short. Calyx as long as the outer bracts. Corolla-tube 1 in. long; lobes lanceolate, pure white, a little shorter than the tube. Lateral staminodes ⅜–¾ in. long, cuneate-obovate, white. Lip rather more than 1 in. long and nearly 1 in. broad, deeply 2-lobed, the lobes with a lilac spot at the base. Connective produced into a quadrate 2-lobed appendage. Fl. B. I. v. 6, p. 219; Grah. Cat. p. 208; Wight, Icon. t. 899; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Prain, Beng. Pl. p. 1038; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 77 (*Kæmpfera*); Watt, Dict. Econ. Prod. v. 4, p. 561.—Flowers: June–July. VERN. *Chanda-mula.*

KONKAN: S. Konkan, *Nimmo* ex *Graham.* DECCAN: Mâwal, *Woodrow.*—DISTRIB. More or less throughout India, often cultivated in gardens; Malay Islands.

The tubers, according to Roxburgh, are employed in perfumery, and they are used in Hindu medicine. The true *Galanga* root of the drug-shops is not however furnished by this plant, but by *Alpinia officinarum*, and a less valuable product by *Alpinia Galanga.* See Watt, Dict. Econ. Prod. l. c.

2. **Kæmpferia pandurata,** *Roxb. in Asiat. Res.* v. 11 (1810) p. 328, t. 2. Stemless; rootstock horizontal, bright yellow within, with many nodose branches and thick succulent vermiform root-fibres. Leaves few (usually 3 or 4), 9–15 by 1¾–4 in., distichous, erect, elliptic-oblong, acute or shortly acuminate, decurrent into a long deeply channelled petiole which reaches 6 in. long, glabrous and green on both surfaces; midrib stout; ligule short, acute, membranous. Flowers in terminal spikes, subsessile among the leaves; bracts about 2 in. long, linear-lanceolate. Calyx-tube about 1 in. long, cylindric, narrow, hyaline, 2-fid. Corolla-tube reaching 2 in. long or more, white or pale pink, very slender, cylindric, erect or curved at the top; segments pink, ¾ in. long, oblong, acute, spreading. Staminodes 3, oblong or lanceolate, spreading, the 2 lateral ½ in. long, equal. Lip ¾ in. broad, elliptic-panduriform, undulate, white tinged with red. Anther erect, recurved; connective produced into a quadrate short 2-fid appendage. Fl. B. I. v. 6, p. 220; Grah. Cat. p. 208; Dalz. & Gibs. Suppl. p. 87; Bot. Reg. t. 173; Trim. Fl. Ceyl. v. 4, p. 243; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 89 (*Kæmpfera*).

KONKAN: *Nimmo* ex *Graham.* GUJARAT: *Nimmo* ex *Graham.*

Graham [Cat. Pl. Bo. (1839) p. 208] notes this as occurring in the Konkans and Gujarat on the authority of Nimmo. It has not, however, been found in either locality by recent collectors, while Dalzell & Gibson (Bo. Fl. Suppl. p. 87) say that they have not been able to trace the plant in the S. Konkan and deny that it is indigenous in the Bombay Presidency. I have seen no specimens from thence. Trimen [Fl. Ceyl. (*l. c.*)] says that it is nowhere wild in Ceylon.—DISTRIB. Birma, Malaya, Andamans, Ceylon, Java.

3. **Kæmpferia scaposa,** *Benth. in Benth. & Hook. Gen. Pl.* v. 3 (1883) p. 642. Leaf-bearing axis of the flowering plant elongate; root-

stock tuberous, oblique; root-fibres long, slender. Leaves numerous, 8–12 by 2–3 in., oblong-lanceolate, long-acuminate, glabrous, green above, paler beneath, narrowed into a deeply channelled petiole as long as the blade. Flowers in terminal dense spikes 3–9 in. long, on usually naked peduncles reaching 18 in. long; bracts the lower remote, the upper dense, 1–2½ in. long, lanceolate, acute, green, persistent, each including a pair of flowers. Calyx tubular, loosely sheathing the corolla-tube, 1–1¼ in. long, 3-toothed, the teeth subequal. Corolla-tube reaching 3½ in. long; lobes lanceolate, ¾ in. long, the posticous cucullate and mucronate. Lateral staminodes oblong, acute, white. Lip broad, 2-fid, more than 1 in. long. Filament short, $\frac{1}{12}$ in. long and as broad; connective produced above the anther into a subtrapezoidal ciliate appendage. Stigma turbinate, tuberculate on the back. Capsules obovoid, red, subtomentose, ½ in. long. Seeds dark brown with a white lacerate aril. Fl. B. I. v. 6, p. 224; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 72. *Hedychium scaposum*, Nimmo, ex Grah. Cat. Pl. Bo. (1839) p. 205; Dalz. & Gibs. p. 273. *Monolophus scaposus*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 143; Wight, Icon. t. 2030.—Flowers: July–Nov. VERN. *Chohola*; *Sunha*.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!; Malwán, *Dalzell*!; banks of rivulets in the S. Konkan, *Dalzell & Gibson*. DECCAN: *Stocks*!, *Woodrow*!; Lanoli, *Woodrow, Graham, King*!; Karli, *Graham, Jacquemont*, 639! KANARA: *Law*!—DISTRIB. India (W. Peninsula).

Kæmpferia rotunda, Linn. Sp. Pl. (1753) p. 3. A stemless plant with a tuberous rootstock and many thick succulent root-fibres bearing oblong tubers. Leaves few, erect, 12 by 3–4 in., oblong, acuminate, mottled green above and pale red-purple beneath. Flowers sweetly fragrant, of various shades of purple and white, appearing in April before the leaves. Cultivated but not indigenous in the Bombay Presidency. Fl. B. I. v. 6, p. 222; Grah. Cat. p. 208; Dalz. & Gibs. Suppl. p. 86; Wight, Icon. t. 2029; Trim. Fl. Ceyl. v. 4, p. 244; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 87; Prain, Beng. Pl. p. 1038; Watt, Dict. Econ. Prod. v. 4, p. 561.—Flowers: Apr. VERN. *Bhui-champa*.

3. **HITCHENIA,** Wall.

Annual herbs; rhizome with tuberiferous fibres. Leaves petiolate or sessile, oblong-lanceolate or elliptic. Flowers in terminal spikes; bracts subcoriaceous, all fertile or the upper sterile, forming a coma. Calyx tubular, membranous, 3-toothed. Corolla-tube elongate, slender, slightly enlarged above; lobes 3, subequal, oblong or ovate. Lateral staminodes petaloid, free from the filiform filament. Lip scarcely longer than the corolla-lobes, orbicular or cuneate, 2-lobed. Anther-cells marginal on the broad connective, not crested; filament as long as the lip, narrow, complicate. Ovary 3-celled; ovules many, superposed; style filiform; stigma exserted beyond the anther-cells, turbinate. Capsule oblong, 3-gonous, coriaceous, crowned by the calyx, variously rupturing or sub-3-valved. Seeds shining, usually arillate.—DISTRIB. Species 3, Indian.

1. **Hitchenia caulina,** *Baker, in Hook. f. Fl. B. I.* v. 6 (1890) p. 224. Rhizome with many ellipsoid tubers hanging to the fibres, the tubers white inside; stem leafy, 3–4 ft. high. Leaves 12–20 by 3–6 in., oblong-lanceolate, acuminate, narrowed at the base, waved, strongly nerved, with sheathing petioles. Flowers yellow or white, in terminal spikes 5–9 in. long and reaching 2½ in. in diam.; bracts 1–1¼ in. long, green or greenish-white, sometimes tinged with red, obovate-cuneate, those of the coma white or occasionally pink, all united together by their backs and edges. Calyx thinly membranous, tubular, 3-fid. Corolla-tube 1½ in. long, slender; lobes thinly membranous, one larger than the other two, the large one ovate-oblong, shortly acuminate, the 2 smaller linear-oblong. Lateral staminodes petaloid, ½ in. long. Lip ½ in. in diam., 2-fid, with a yellow band at the division. Anther-cells oblong, spurred at the base. Ovary 3-celled; style hidden between the cells of the anther; stigma 2-lipped, funnel-shaped, ciliate at the top, projecting beyond the anther. Seeds ovoid, with a lacerate aril. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 97. *Curcuma caulina*, Grah. Cat. Pl. Bo. (1839) p. 210; Dalz. & Gibs. p. 275; Watt, Dict. Econ. Prod. v. 2, p. 658.—Flowers: Aug.–Oct. VERN. *Chávar.*

DECCAN: Mahableshwar, abundant, *Graham, Dalzell & Gibson, Cooke*!, *Woodrow*!, *H. M. Birdwood*; Khandala, *Cooke*!; Panchgani, *Woodrow*.—DISTRIB. India (W. Peninsula).

Known to Anglo-Indians at Mahableshwar as the *Arrowroot Plant*. Arrowroot was at one time extracted from the tubers by the Chinese gardeners on the hill. See Watt, Dict. Econ. Prod. l. e.

4. **HEDYCHIUM,** Koenig.

Herbs with perennial tuberous rootstocks; root-fibres hardly thickened; stem elongate, leafy. Leaves distichous, oblong or lanceolate. Flowers usually in terminal spikes; bracts oblong, subcoriaceous, 1- or more-flowered. Calyx tubular, 3-toothed. Corolla-tube long, slender; lobes equal, linear, spreading. Perfect stamen 1; lateral staminodes linear or cuneate-oblong. Lip large, 2-fid. Ovary 3-celled; ovules many, superposed on axile placentas; style long, filiform; stigma subglobose. Fruit a globose 3-valved capsule. Seeds many, small, with a lacerate aril.—DISTRIB. Species 38, chiefly Indian and Malayan.

1. **Hedychium coronarium,** *Koenig, in Retz. Obs. Bot.* fasc. 3 (1783) p. 73. Stem 3–5 ft. high, erect; rootstock stout, horizontal, ½–2 in. in diam., fleshy, jointed. Leaves sessile, 9–14 by 1¼–2¼ in., lanceolate, finely acuminate, glabrous above, glabrous or sparsely pubescent beneath and on the midrib, base narrowed; sheath smooth; ligule ¾–1¼ in. long, membranous. Flowers fragrant, pure white, in dense oblong spikes 4–8 in. long; bracts closely imbricate, 3–4-flowered, the outer 1½–2 by 1 in., at first green, becoming brown by age, ovate, obtuse; bracteoles 3, membranous. Calyx 1–1½ in. long, cylindric, green, shorter than the bracts. Corolla-tube 3 in. long; segments linear, half as long as the tube, reflexed. Lateral staminodes 1½–2 by ½ in., oblong-lanceolate, subobtuse, white. Lip 1½–2 in. broad, suddenly contracted into a short claw, entire or 2-fid; lobes short, rounded. Stamen 1¾ in. long; anther about ½ in. long. Capsules oblong, glabrous, the valves orange-

yellow inside. Seeds many, with a crimson aril. Fl. B. I. v. 6, p. 225; Grah. Cat. p. 205; Dalz. & Gibs. Suppl. p. 86; Wight, Icon. t. 2010; Bot. Mag. t. 708; Trim. Fl. Ceyl. v. 4, p. 245; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 44; Prain, Beng. Pl. p. 1039.—Flowers: Aug.–Sept. VERN. *Sontaka.*

KONKAN: *Law!* DECCAN: Lanoli, *Woodrow*; Mahableshwar, *H. M. Birdwood.* KANARA: Kála naddi near Supa, *Ritchie*, 1435!—DISTRIB. Throughout India; Ceylon, Malay Islands.

5. **CURCUMA,** Linn.

Stemless herbs with tuberous rootstocks bearing sessile and long-stipitate tubers. Leaves usually oblong, often very large. Flowers in dense compound spikes, vernal or æstival, and preceding, or autumnal and contemporaneous with the leaves, crowned by a coma of enlarged colored bracts; lower bracts ovate, membranous, enclosing several bracteolate fugacious flowers which open in succession. Calyx short, cylindric, minutely toothed. Corolla-tube funnel-shaped; corolla-lobes usually ovate or oblong, the upper longer and somewhat concave. Stamen 1 perfect; filament short; anthers not crested, with contiguous cells spurred at the base; lateral staminodes oblong, petaloid, connate with the filament. Lip orbicular, with a deflexed tip. Ovary 3-celled; ovules numerous on axile placentas; style filiform; stigma 2-lipped, the lips ciliate. Fruit a tardily dehiscent globose membranous 3-valved capsule. Seeds ovoid or oblong, usually arillate.—DISTRIB. Species about 40, chiefly in S.E. Asia.

Flowering spike vernal or æstival, lateral, apart from and usually appearing before the leafy spike.	
Leaves 6–10 in. long; rootstock small, emitting fleshy fibres terminating in small tubers white inside; corolla-lobes pink	1. *C. neilgherrensis.*
Leaves 15–24 in. long; rootstock large, of palmately branched sessile tubers yellow inside; corolla-lobes pink	2. *C. aromatica.*
Flowering spike autumnal, rising in the centre of a previously formed tuft of leaves.	
Rootstock small, bearing tubers at the ends of the fibres (no sessile tubers); tubers white inside.	
Flowers yellow	3. *C. pseudomontana.*
Flowers purple	4. *C. decipiens.*
Rootstock large; tubers sessile, pale yellow inside	5. *C. Amada.*

1. **Curcuma neilgherrensis,** *Wight, Icon.* v. 6 (1853) p. 16, t. 2006. Whole plant with the leaves rarely reaching 16 in. high, sometimes not more than 3 in. or even less before the leaves appear; rootstock small, white inside; root-fibres numerous, slender. Leaves 6–10 by 1½–2½ in., shortly petiolate, lanceolate or oblong-lanceolate, acuminate, glabrous, narrowed at the base. Flowers bright yellow, in dense vernal spikes of variable length depending on the size of the plant (in well-grown specimens reaching 4 in. long by 2 in. in diam.); peduncles of variable length with sheaths at the base; flowering bracts 1–1½ in. long, oblong-lanceolate, acute, pale yellowish-green, the bracts of the coma dense, pink. Calyx ⅓ in. long, 3-toothed, split down one side. Corolla-tube ⅝ in. long; lobes oblong. Lip broadly ovate or suborbicular,

more highly colored than the lobes, obtuse, 2-fid at the apex. Capsules glabrous, globose, ½ in. in diam. Fl. B. I. v. 6, p. 210; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 109. *Curcuma angustifolia*, Dalz. & Gibs. Bo. Fl. (1861) p. 274 (*not* of Roxb.).

KONKAN: *Stocks*!, *Law*! DECCAN: Sinhagad near Poona, *Woodrow*. S. M. COUNTRY: Dharwar, *Law*! KANARA: *Law*!—DISTRIB. India (W. Peninsula).

2. **Curcuma aromatica,** *Salisb. Parad. Lond.* t. 96 (1805). Rootstock large, of palmately branched, sessile annulate biennial tubers yellow and aromatic inside. Leaves 15–24 by 4–8 in., oblong-elliptic or oblong-lanceolate, caudate-acuminate, green, often variegated above, pubescent beneath, base deltoid; petioles as long as or longer than the blade. Flowering stem appearing with or before the leafing stem, as thick as the forefinger, sheathed. Flowers fragrant, shorter than the bracts, in spikes 6–12 in. long; flowering bracts 1½–2 in. long, ovate, recurved, cymbiform, rounded at the tip, pale green, connate below forming pouches for the flowers; bracts of the coma 2–3 in. long, more or less tinged with red or pink. Calyx ⅓ in. long, irregularly 3-lobed. Corolla-tube 1 in. long, the upper half funnel-shaped; lobes pale rose-colored, the lateral lobes oblong, the dorsal longer, ovate, concave, arching over the anthers. Lip yellow, obovate, deflexed, subentire or obscurely 3-lobed. Lateral staminodes oblong, obtuse, as long as the corolla-lobes. Fl. B. I. v. 6, p. 210; Wight, Icon. t. 2005; Rosc. Monandr. Pl. (1828) t. 103; Trim. Fl. Ceyl. v. 4, p. 241; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 111; Prain, Beng. Pl. p. 1041; Watt, Dict. Econ. Prod. v. 2, p. 655. *Curcuma zedoaria*, Roxb. As. Res. v. 11 (1810) p. 333 (*not* of Rosc.); Grah. Cat. p. 209; Dalz. & Gibs. p. 274; Bot. Mag. t. 1546.—Flowers: May. VERN. *Rán-haldi*; *Amba-halad.*

KONKAN: *Dalzell & Gibson*; moist shady places in the Konkan, *Graham*; Kanheri forests, *Graham*; Parel Hill (Bombay), *Graham*.—DISTRIB. India (Bengal, W. Peninsula); sometimes cultivated and known as *Yellow Zedoary*. The tubers are used medicinally. See Watt, Dict. Econ. Prod. l. c.

3. **Curcuma pseudomontana,** *Grah. Cat. Pl. Bomb.* (1839) p. 210. Rootstock small, bearing small almond-like or subglobose tubers at the ends of the fibres (but no sessile tubers); tubers pure white inside, edible. Leaves uniformly green, reaching 2 ft. or more long (including the petiole), 4–6 in. broad, lanceolate-oblong, acuminate, tapering to the base; petioles 8–15 in. long. Flowers appearing with the leaves, bright yellow, 2 or 3 in each bract, in autumnal central narrowly oblong spikes 2–5 by 1–1¾ in.; peduncles 3–4 in. long, embraced by leaf-sheaths; flowering bracts 1¼–1¾ by ⅝–⅞ in., obovate-lanceolate, green with an acute pink tip; bracts of coma oblong-lanceolate, the lowest with purple edges only, the upper more or less uniformly mauve-purple. Dalz. & Gibs. p. 275; Lisboa, in Journ. Bomb. Nat. v. 2 (1887) p. 144; Watt, Dict. Econ. Prod. v. 2, p. 669. *Curcuma Ranadei*, Prain, in Journ. Bomb. Nat. v. 11 (1898) p. 463; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 440. *C. montana*, Baker, in Hook. f. Fl. B. I. v. 6, p. 214 *in part* (*not* of Rosc.); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520.—Flowers: Sept. VERN. *Sindarbar*; *Shindalvan.*

KONKAN: *Stocks*!, *Law*!, *Dalzell & Gibson*; Salsette, *Graham*.

Baker in Hook. f. Fl. B. I. l. c. has reduced this to *C. montana*, Roxb., but the tubers in Roxburgh's plant are sessile and yellow inside, while Graham, though admitting that his plant is closely allied to *C. montana*, describes its tubers as *hanging from the fibres of the rootstock and perfectly white inside*. There are unfortunately no rhizomes to any of the specimens in Herb. Kew. which have been named *C. montana* or *C. pseudomontana*, and an examination of fresh specimens by botanists on the spot is very desirable. Graham makes a mistake in his description in stating that the leaves are 19 inches wide, an error which Dalzell & Gibson reproduce, reducing the width however to 18 inches.

The description given by Graham, though rather indefinite as to size and shape of tubers, seems to fit the plant described as *C. Ranadei* by Colonel Prain (Journ. Bomb. Nat. l. c.). Thus, the lower bracts of the coma are, in the case of *C. Ranadei*, described by Colonel Prain as having purple edges, while the bracts of *C. pseudomontana* are said by Graham to have their edges dark brown or reddish. Again, the upper bracts of the coma of *C. Ranadei* are described as more or less uniformly mauve-purple, those of *C. pseudomontana* as dark rose-colored. The flowers in both are bright yellow, the inflorescence being central. The fact that *C. Ranadei* was grown in a pot in Calcutta from a tuber accidentally sent from Bombay together with rhizomes of *Kæmpferia scaposa*, under climatic conditions differing greatly from those of the natural home of the plant in the Konkan hills, might account for minor differences.—DISTRIB. India (W. Peninsula), apparently endemic.

The tubers are boiled and eaten in times of scarcity according to Graham.

4. **Curcuma decipiens,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 144. Rootstock bearing numerous almond-like tubers white inside at the ends of the fibres, but with no sessile tubers. Leaves 6–8 by 3–5 in., broadly elliptic, shortly deltoid-acuminate, membranous, green, usually glabrous, base rounded or subcordate; petioles as long as the leaf. Flowers twin, purple, in æstival spikes $2\frac{1}{2}$–5 by 1–$1\frac{3}{4}$ in., those which first emerge from the soil lateral, the later spikes central; peduncles $2\frac{1}{2}$–3 in. long; flowering bracts 1 in. long, ovate, obtuse, saccate, purple; bracts of the coma numerous, oblong, purple. Calyx nearly $\frac{1}{2}$ in. long, obtusely toothed, puberulous below the teeth and near the base. Corolla purple; tube twice as long as the calyx; lobes oblong-lanceolate. Lip obovate, 2-fid, with crisped margins. Fl. B. I. v. 6, p. 215; Dalz. & Gibs. p. 274; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 105.—Flowers: June–Sept.

KONKAN: *Law*!, *Stocks*!, *Dalzell*!; Malwán, *Dalzell*!; Uran (island in Bombay Harbour), *Dalzell*!—DISTRIB. India (W. Peninsula), apparently endemic.

5. **Curcuma Amada,** *Roxb. in Asiat. Res.* v. 11 (1810) p. 341. Rootstock large; sessile tubers thick, cylindric or ellipsoid, pale yellow inside. Leaves long-petiolate, in tufts, the blade 12–18 by 3–5 in., oblong-lanceolate, acute or acuminate, narrowed to the base, glabrous and green on both sides; petioles as long as the leaf-blade (12–18 in.). Flowers in autumnal spikes 3–6 by $1\frac{1}{2}$–2 in., in the centre of the tuft of leaves; peduncle 6 in. long or more; flowering bracts 1 in. long, greenish-white; bracts of the coma longer and narrower, tinged with pink or red. Calyx nearly $\frac{1}{2}$ in. long, obtusely 3-toothed. Corolla white or very pale yellow; tube about 1 in. long; lobes oblong, acute. Lip semi-elliptic, yellow, 3-lobed, the middle lobe emarginate. Fl. B. I. v. 6, p. 213; Grah. Cat. p. 209; Dalz. & Gibs. p. 275; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 108; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; Prain, Beng. Pl. p. 1041; Watt, Dict. Econ. Prod. v. 2, p. 652.—Flowers: Sept.

KONKANS and GUJARAT, *Nimmo* ex *Graham*. I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew. Woodrow in his list merely quotes Nimmo.—DISTRIB. India (Bengal, W. Peninsula); Malay Peninsula and Archipelago.

The plant is often cultivated and known as the *Mango-Ginger*; the tubers when fresh have somewhat the odor of a green Mango, hence the name. They are employed in native medicine as carminative and stomachic. See Watt, Dict. Econ. Prod. l. c.

Curcuma zedoaria, Rosc. Monandr. Pl. (1828) t. 109. Rootstock of palmately-branched sessile cylindric oblong annulate tubers, pale yellow inside, with a camphoraceous odor and bitterish spicy taste, also bearing long fleshy fibres that terminate in smaller oblong less fragrant tubers. Leaves 4–6 with long petioles, 1–2 ft. long, oblong-lanceolate, finely acuminate, glabrous on both surfaces, clouded with purple down the middle. Flowering stem 8–10 in. long, appearing before the leaves, stout, clothed with obtuse sheaths. Flowers yellow in spikes 3-5 by 2–3 in.; flowering bracts 1½ in. long, ovate, recurved, cymbiform, green tinged with red; bracts of the coma reaching 2 in. long, crimson or purple. Calyx ⅓ in. long, obtusely 3-toothed. Corolla-tube twice as long as the calyx, funnel-shaped; lateral lobes oblong, the dorsal lobe larger, vaulted, arching over the anther. Lip ½ in. broad, suborbicular, deflexed, obscurely 3-lobed, deep yellow. Capsule ovoid, 3-gonous, thin, smooth, bursting irregularly. Seeds ellipsoid with a white lacerate aril. Fl. B. I. v. 6, p. 210; Trim. Fl. Ceyl. v. 4, p. 241; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 110; Prain, Beng. Pl. p. 1041; Watt, Dict. Econ. Prodr. v. 2, p. 669. *Curcuma Zerumbet*, Roxb. in Asiat. Res. v. 11 (1810) p. 333; Grah. Cat. p. 209.—VERN. *Kachora.*

Not wild in the Bombay Presidency; cultivated more or less throughout India; said to be wild in the Eastern Himalaya and in Chittagong.

The tubers are employed in native medicine as a stomachic and also as an application to bruises and sprains. Powdered and dried they used to form one of the constituents of the red powder used by the Hindus at the Holi festival. See Watt, Dict. Econ. Prod. l. c.

Curcuma longa, Linn. Sp. Pl. (1753) p. 2. A tall herb; rootstock large, ovoid, with sessile cylindric tubers orange inside. Leaves very large, in tufts, reaching 4 ft. or more long (including a petiole about as long as the blade), oblong-lanceolate, tapering to the base. Flowers in autumnal spikes 4–6 by 2 in.; peduncles 6 in. long or more, hidden by the sheathing petiole; flowering bracts pale green; bracts of the coma tinged with pink. The plant is cultivated all over India for the *turmeric* obtained from its rhizomes, but is doubtfully wild anywhere in India, though Mr. Clarke considers it to be wild in Behar, and Prain says it may perhaps be indigenous in Chota Nagpur. Watt (Dict. Econ. Prod. v. 2, p. 660) suggests that it may have been introduced from China or Cochinchina. It is largely cultivated in the Bombay Presidency in places where the soil is good and the water-supply abundant. Fl. B. I. v. 6, p. 214; Grah. Cat. p. 209; Dalz. & Gibs. p. 87; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 520; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 108; Prain, Beng. Pl. p. 1041; Watt, Dict. Econ. Prod. v. 2, p. 659.—VERN. *Haldi.*

6. **AMOMUM,** Linn.

Herbs with elongate leafy stems and perennial extensive rootstocks. Leaves usually oblong-lanceolate. Flowers in dense spikes direct from the rootstock; bracts imbricate. Calyx cylindric, 3-toothed. Corolla-tube cylindric; lobes 3, oblong or linear-oblong, the upper often broader and more convex. Stamen 1 perfect; filament short, arcuate; anther 2-celled, the cells divaricate, sometimes hairy, often with a petaloid crest; lateral staminodes minute or obsolete. Lip broad or ligulate. Ovary 3-celled; ovules many, superposed; placentas axile; style filiform; stigma small, subglobose, or larger and dorsally gibbous. Fruit indehiscent or bursting irregularly, sometimes beaked or winged or echinate. Seeds globose or truncate.—DISTRIB. India, Malayan Archipelago, New Guinea, Australia, Philippine Islands, China, Japan; species about 87.

1. **Amomum microstephanum,** *Baker, in Hook. f. Fl. B. I.* v. 6 (1892) p. 239. A perennial herb reaching 4 ft. or more in height; stems leafy. Leaves large, 20–24 by 2½–4 in., linear-lanceolate, acuminate, glabrous above, silky-pubescent beneath, base tapering; petioles 3–7 in. long. Flowers white, in globose shortly pedunculate spikes 2 in. in diam.; exterior bracts few, oblong, glabrous, 1–1⅝ in. long, the inner bracts membranous. Calyx ¾–⅞ in. long, tubular, membranous, 3-toothed, split down one side. Corolla-tube shorter than the calyx; lobes linear-oblong, half as long as the tube. Lip 1¼ in. long, obovate. Anther glabrous, ½ in. long; crest small, orbicular. Capsules 9-ribbed, echinate. K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 257.

Rare. KONKAN: *Stocks*!; near Chandavár (planted), *Ritchie*!—DISTRIB. India (W. Peninsula).

7. **ZINGIBER,** Adans.

Herbs with elongated leafy stems and horizontal tuberous rootstocks. Leaves oblong-lanceolate. Flowers in spikes usually radical, less commonly terminal, very rarely lateral on the leafy stems; peduncle short or long; bracts persistent, usually 1-flowered. Calyx cylindric, shortly 3-lobed. Corolla 3-lobed, with a cylindric tube; lobes lanceolate, the upper concave. Stamen 1 perfect; filament short; anther 2-celled, the cells contiguous, with a narrow crest as long as themselves; lateral staminodes 0, or adnate to the obovate-cuneate lip. Ovary 3-celled; ovules many, superposed; placentas axile; style filiform; stigma small, subglobose. Fruit an oblong capsule, tardily dehiscent. Seeds large, globose, arillate.—DISTRIB. Species 55, East Indies, Malaya, and New Guinea; 1 species widely cultivated throughout the Tropics.

Spikes produced direct from the rootstock very short and dense; peduncles very short or 0.
- Leaves pubescent beneath; lip yellow ..... 1. *Z. Nimmonii.*
- Leaves glabrous beneath; midlobe of lip variegated pink and white; the side lobes red and yellow .. ...?..... 2. *Z. cernuum.*

Spikes terminating elongate peduncles beset with sheathing scarious bracts.
Leaves glabrous beneath; bracts green ..... 3. *Z. Zerumbet.*
Leaves pubescent beneath; bracts reddish.
Lip yellowish-white, marked with purple lines; side lobes of lip small; capsule ellipsoid, 1 in. long..... 4. *Z. macrostachyum.*
Lip yellowish-white, not marked with purple lines; side lobes of lip large; capsule subglobose, $\frac{2}{3}$ inch long ..... 5. *Z. Cassumar.*

1. **Zingiber Nimmonii,** (by error *Nimmoi*, corrected in Dalz. & Gibs. Bo. Fl. p. 273), *Dalz. in Kew Journ. Bot.* v. 4 (1852) p. 341. Stem leafy, 4–5 ft. high, as thick as the middle finger, reddish-green, glabrous. Leaves 6–12 by 2–3 in., nearly sessile, oblong-lanceolate, acuminate, green and glabrous above, pubescent beneath, base acute; petioles scarcely $\frac{1}{8}$ in. long, with long sheaths and a short truncate ligule about $\frac{1}{10}$ in. long. Flowers in shortly pedunculate ovate or subglobose spikes scarcely rising above the ground; bracts linear-oblong or lanceolate, acute, glabrous, green streaked with red, the inner 2-fid. Corolla-tube as long as the bracts; lobes reddish-yellow. Lip 3-lobed, yellow; midlobe rotund-ovate or subobovate, scarcely emarginate; side lobes small, rounded. Capsules ellipsoid, the size of a pigeon's egg. Fl. B. I. v. 6, p. 244; Dalz. & Gibs. p. 273; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 184. *Alpinia Nimmonii*, Grah. Cat. Pl. Bo. (1839) p. 206.—Flowers: July.

KONKAN: *Stocks!*, *Law!*; N. & S. Konkan, *Dalzell & Gibson*; Sahyadri range, *Dalzell!* DECCAN: Lanoli Grove, abundant, *Graham*; Khandala, *Graham.* KANARA: *Law!*—DISTRIB. India (W. Peninsula).

2. **Zingiber cernuum,** *Dalz. in Kew Journ. Bot.* v. 4 (1852) p. 342. Stem bright green, somewhat curved, glabrous. Leaves narrowly elliptic, acuminate, glabrous on both sides. Spikes ovate, obtuse, very shortly pedunculate, scarcely appearing above the ground; bracts ovate or oblong, somewhat obtuse, greenish-yellow, glabrous, the inner shortly 3-fid. Corolla buff-colored. Lip 3-lobed; midlobe ovate, deeply 2-fid, variegated with white and red; side lobes variegated with red and yellow. Fruit yellowish-white, smooth. Seeds (unripe) red, striated; aril membranous. Fl. B. I. v. 6, p. 245; Dalz. & Gibs. p. 273; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 182.—Flowers: July.

S. M. COUNTRY: Rámghát, *Dalzell.*
The description above is that of Dalzell. I have seen no specimens; there are none in Herb. Kew.
The plant unfortunately flowers in July, at which time the whole of the hill-sides are streaming with water, rendering plant-collecting a task of no ordinary difficulty. It is hoped that local botanists will endeavour to procure specimens, describe them when fresh, and send some to the Kew Herbarium.—DISTRIB. India (W. Peninsula).

3. **Zingiber Zerumbet,** *Roscoe, ex Smith, Exot. Bot.* v. 2 (1805) p. 105, t. 112. Rootstock large, not much branched, hard, biennial, yellow inside, with a strong aromatic ginger-like taste, but with some bitterness; root-fibres vermiform; leafing stem 3–5 ft. high, about $\frac{1}{2}$ in. in diam., cylindric, glabrous, annual. Leaves 8–12 by 2–3 in., sessile, oblong-lanceolate or oblanceolate, acuminate, glabrous, base narrowed;

ligule ½–¾ in. long, truncate, membranous. Flowering stem 12–18 in. long, stout, usually flexuous, clothed with long appressed obtuse sheaths. Flowers pale sulphur-yellow, in conico-oblong or ovoid obtuse spikes 3–4 by 2 in.; bracts 1–1½ in. long, closely imbricate, ovate-oblong or obovate, with rounded apex and pale membranous margins, bright green at first but becoming red in fruit. Calyx-tube 1 in. long, appressed to the corolla-tube, 3-toothed, glabrous. Corolla-tube 1¼ in. long; lobes ovate-lanceolate, acuminate, the lateral smaller, adnate to the base of the lip. Lip shorter than the corolla-lobes and of a darker yellow, 3-fid; lobes obtuse, the midlobe the longest. Anther glabrous. Style glabrous; stigma minute, funnel-shaped with ciliate mouth. Capsules ellipsoid, 1 in. long. Seeds ⅛ in. long, oblong, black. Fl. B. I. v. 6, p. 247; Grah. Cat. p. 207; Dalz. & Gibs. p. 272; Wight, Icon. t. 2003; Bot. Mag. t. 2000; Trim. Fl. Ceyl. v. 4, p. 259; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 172; Prain, Beng. Pl. p. 1044; Watt, Dict. Econ. Prod. v. 6, part 4, p. 366.—Flowers: July.

KONKAN: *Nimmo* ex *Graham*; common about old wells in the S. Konkan, *Dalzell & Gibson*; sometimes cultivated.—DISTRIB. Throughout India; Ceylon, Malay Peninsula; widely cultivated in the Tropics of the Old World.

4. **Zingiber macrostachyum,** *Dalz. in Kew Journ. Bot.* v. 4 (1852) p. 342. Leafing stem reaching 20 in. high, red, pubescent. Leaves sessile, 5–12 by 1–2 in., lanceolate, acuminate, dark green and glabrous above, paler and pubescent beneath; sheaths ribbed, puberulous near the top; ligule ⅛ in. long, 2-lobed, the lobes rounded, pubescent. Flowers in long cylindric spikes 6–12 in. long; peduncle about as long as the spike, with large oblong bract-like scarious sheaths; bracts obovate, acute, reddish, reaching 1¼ in. long. Corolla white or greenish-white; tube as long as the bracts; lobes lanceolate, nearly 1 in. long. Lip obovate, 3-lobed; midlobe rounded, emarginate, pale yellow marked with diverging purple lines; lateral lobes small, obtuse. Capsules obovoid, pubescent, red, of the size of a sparrow's egg. Seeds dark purple with a large white aril. Fl. B. I. v. 6, p. 247; Dalz. & Gibs. p. 273; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 179. *Alpinia Neesana*, Grah. Cat. Pl. Bo. (1839) p. 207.—Flowers: July. VERN. *Nisam.*

KONKAN: Wargaon, *Graham.* DECCAN: Mahableshwar, *H. M. Birdwood*; Khandala, *Graham*; Lanoli on the borders of the grove, *Graham.* S. M. COUNTRY: Rámghát, *Dalzell.* KANARA: Kála naddi, *Ritchie*, 719!—DISTRIB. India (W. Peninsula), apparently endemic.

5. **Zingiber Cassumar,** *Roxb. in Asiat. Res.* v. 11 (1810) p. 347, t. 5. Rootstock perennial, yellow inside, with an aromatic, warm, somewhat camphoraceous taste, without bitterness. Leafing stem 4–6 ft. high. Leaves subsessile, 9–14 by ¾–1½ in., oblong-lanceolate, acute, glabrous above, pubescent beneath, base slightly rounded; sheaths pubescent. Flowers in dense fusiform or oblong-ellipsoid spikes 3½–6 by 1½–2 in.; peduncles 4–10 in. long, with numerous oblong sheaths; bracts 1–1½ in. long and nearly as broad as long, broadly ovate, subacute, bright-red or greenish-red, or green, pubescent and

with narrow membranous margins. Calyx ¾ in. long, membranous, truncate, glabrous, split half-way down. Corolla-tube 1 in. long, slender, glabrous; lobes lanceolate, the lateral 1 by ¼ in., the dorsal 1¼ by ⅜ in., concave. Lip suborbicular, deeply 2-lobed, nearly 1 in. in diam., yellow (not spotted), with crisped margins. Stamen yellowish-white, shorter than the lip, the appendix of the connective long, flexuous. Style glabrous; stigma obconic, ciliate. Capsules subglobose, ⅔ in. long, membranous. Seeds many, very small, purple. Fl. B. I. v. 6, p. 248; Grah. Cat. p. 207; Dalz. & Gibs. p. 272; Trim. Fl. Ceyl. v. 4, p. 258; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 179; Prain, Beng. Pl. p. 1044; Watt, Dict. Econ. Prod. v. 6, part 4, p. 357.—Flowers: July–Aug. VERN. *Malbári-halad.*

KONKAN: *Stocks*!; W. Ghâts, *Woodrow*. S. M. COUNTRY: Londa, *Woodrow*. KANARA: *Law*!—DISTRIB. Throughout India; Ceylon, Malay Peninsula; widely cultivated in Tropical Asia.

Zingiber officinale, Roscoe, in Trans. Linn. Soc. v. 8 (1807) p. 348. A herb with slender leafy stems 3–4 ft. high, which furnishes the *Ginger* of commerce, not apparently known in the wild state, but doubtless a native of Tropical Asia. It is cultivated largely throughout the tropics. It rarely flowers and still more rarely produces seed (*Roxburgh*). It is extensively grown in the Deccan and Gujarat.—VERN. *Ale, Adrak* (the fresh root); *Sunt* (the dried root). Fl. B. I. v. 6, p. 246; Grah. Cat. p. 207; Dalz. & Gibs. Suppl. p. 87; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 170; Prain, Beng. Pl. p. 1044; Watt, Dict. Econ. Prod. v. 6, part 4, p. 358.

8. **COSTUS,** Linn.

Herbs with long leafy stems; rootstock tuberous, horizontal. Leaves oblong, with broad sheaths. Flowers in dense globose or ovoid usually terminal heads. Calyx short, funnel-shaped; teeth 3, ovate. Corolla-tube short; corolla-lobes large, oblong, subequal. Stamen 1 perfect; filament forming with the connective an oblong petaloid process with the contiguous linear anther-cells situated in its middle; lateral staminodes minute or obsolete. Lip large, obovate, with incurved margins. Ovary 3-celled; ovules many, superposed; placentas axile; style filiform; stigma with a semi-linear marginally ciliate foveola. Fruit a globose or ovoid capsule tardily opening on one side between the ribs. Seeds obovoid or subglobose; aril short.—DISTRIB. Species nearly 100, in the tropics of both hemispheres.

1. **Costus speciosus,** *Smith, in Trans. Linn. Soc.* v. 1 (1791) p. 249. An erect plant 4–9 ft. high; rootstock tuberous, insipid; stem subwoody at the base. Leaves 6–12 by 2¼–3 in., subsessile, spirally arranged, oblong or oblanceolate-oblong, acute or acuminate, often cuspidate, glabrous above, silky-pubescent beneath, base rounded; sheaths coriaceous; ligule 0. Flowers white, numerous, in very dense spikes 2–5 by 1½–3 in.; bracts ¾–1¼ in. long, ovate, acuminate, often pungently mucronate, bright-red; bracteole solitary below the calyx,

$\frac{5}{8}$ in. long. Calyx $1\frac{1}{4}$ in. long; lobes $\frac{1}{4}$ in. long, deltoid-ovate, cuspidate. Corolla-tube as long as the calyx; lobes ovate-oblong, apiculate, the lateral lobes $1\frac{3}{8}$ by $\frac{1}{2}$ in., the dorsal $1\frac{5}{8}$ by $\frac{3}{4}$ in. Lip suborbicular, white with a yellow centre, 2 in. and more in diam., concave, plicate, crisped, the margins sometimes meeting in the middle; disk pubescent and with a tuft of hairs at its base. Stamen $1\frac{1}{2}$–$1\frac{3}{4}$ in. long, with a tuft of hairs at the base of the filament; connective petaloid, $\frac{1}{2}$ in. broad, pubescent, produced into a glabrous appendage as long as the linear anther-cells. Style $1\frac{1}{2}$ in. long, slender; stigma with a semilunar ciliate mouth. Capsules globosely 3-gonous, $\frac{3}{4}$ in. in diam., red. Seeds black, with a white aril. Fl. B. I. v. 6, p. 249; Grah. Cat. p. 208; Dalz. & Gibs. p. 274; Trim. Fl. Ceyl. v. 4, p. 246; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 398; Prain, Beng. Pl. p. 1045; Watt, Dict. Econ. Prod. v. 2, p. 579.—Flowers: Aug.–Oct. VERN. *Kosht.*

KONKAN: W. Ghâts, *Woodrow*, *Ritchie*, 1438!; Kanheri forests, *Graham*; Salsette, *Graham*. DECCAN: Khandala, *Graham*, *Cooke*! S. M. COUNTRY: Castlerock, *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, Malay Islands.

9. **ALPINIA,** Linn.

Herbs with elongate leafy stems and horizontal rootstocks. Leaves oblong or lanceolate. Flowers in terminal racemes or panicles; bracteoles large, sometimes enveloping the buds. Calyx loosely tubular, 3-toothed. Corolla-tube cylindric, rarely longer than the calyx; corolla-lobes oblong or linear-oblong, the upper usually broader and more convex than the lateral. Stamen 1 perfect; filament flattened; anther-cells diverging at the top, occasionally with an orbicular crest; lateral staminodes minute or obsolete. Lip spreading, often orbicular, with incurved margins, sometimes with 2 subulate processes at the base of the claw. Ovary 3-celled; ovules few or many on each placenta; style filiform; stigma subglobose. Fruit globose, dry or fleshy, usually indehiscent. Seeds globose or angled.—DISTRIB. India, Malaya, Philippines, New Guinea, Pacific Islands, China, Japan; species about 150.

Lip broadly elliptic, white striated with red; fruit orange-red ... 1. *A. Galanga.*
Lip obovate-cuneate, emarginate, pink; fruit black ..... 2. *A. Allhugas.*

1. **Alpinia Galanga,** *Swartz*, *Obs. Bot.* (1791) p. 8. Rootstock perennial, tuberous, slightly aromatic. Leaves 9–18 by $1\frac{1}{2}$–$4\frac{1}{2}$ in., oblong-lanceolate, acute, glabrous, green above, paler beneath, with slightly callous white margins; sheaths long, glabrous; ligule reaching $\frac{3}{8}$ in. long, but usually shorter, rounded. Flowers greenish-white, in dense-flowered panicles 6–12 in. long; branches short; rhachis pubescent; pedicels $\frac{1}{8}$–$\frac{1}{6}$ in. long; bracts $\frac{3}{8}$ in. long, ovate-lanceolate. Calyx $\frac{3}{8}$ in. long, tubular, irregularly 3-toothed. Corolla $1\frac{1}{4}$ in. long; tube $\frac{1}{2}$ in. long; lobes oblong, obtuse, subequal, $\frac{1}{4}$ in. broad. Lip $\frac{7}{8}$ in. long; claw green, $\frac{1}{4}$ by $\frac{1}{10}$ in.; blade white striated with red, rather more than $\frac{1}{2}$ in. long, broadly elliptic, shortly 2-lobed at the apex, with a pair of subulate glands at the base of the claw. Stamen $\frac{3}{4}$ in. long. Fruit the size of a small cherry, orange-red. Fl. B. I. v. 6, p. 253; Grah. Cat. p. 206; Dalz. & Gibs. p. 274; Woodr. in Journ.

Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 316; Prain, Beng. Pl. p. 1046; Watt, Dict. Econ. Prod. v. 1, p. 192.—Flowers: May. VERN. *Kulinján.*

KONKAN: *Stocks!*, *Law!*; S. Konkan, *Nimmo* ex *Graham*, *Dalzell!*; Wari country, truly wild on Wág-donger, *Dalzell & Gibson.* KANARA: N. Kanara, *Talbot*, 2552!—DISTRIB. Throughout India, often cultivated; Ceylon, Malay Islands.

2. **Alpinia Allhugas,** *Roscoe, in Trans. Linn. Soc.* v. 8 (1807) p. 346. A stout perennial herb 3–6 ft. high; root tuberous, aromatic. Leaves 8–18 by 1¾–4 in., sessile or nearly so, linear-oblong or oblong-lanceolate, acuminate, cuspidate, glabrous, base acute; sheaths long, glabrous, striate, compressed; ligule nearly ¼ in. long, obtuse, glabrous. Flowers inodorous, pink, in erect, decompound, lax- or dense-flowered panicles 6–12 in. long, the branches short, ascending, with large narrowly linear deciduous floral leaves sometimes reaching 9 in. long, at the lower forks; rhachis pubescent or tomentose; pedicels short; bracts small, ovate, cupular. Calyx subcampanulate, ⅜–½ in. long, pubescent, the mouth oblique, obtusely 2–3-toothed. Corolla-tube about as long as the calyx; lobes longer than the tube, linear-oblong, cymbiform, dorsally pubescent, shortly spurred below the hooded tip. Lip rather more than 1 in. long (including the slender claw), pink, obovate-cuneate or suborbicular, 2-fid, the margins waved and erose; claw as long as the limb, with 2 linear-subulate glands 1/10 in. long at the base. Stamen arcuate, shorter than the lip; connective not or obscurely crested. Style glabrous; stigma small. Fruit black, thin, globose, ⅔ in. in diam., irregularly rupturing. Seeds many, small, black, angular. Fl. B. I. v. 6, p. 253; Grah. Cat. p. 206; Dalz. & Gibs. p. 273; Trim. Fl. Ceyl. v. 4, p. 247; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 344; Prain, Beng. Pl. p. 1046; Watt, Dict. Econ. Prod. v. 1, p. 192.—VERN. *Taraka.*

KONKAN: S. Konkan, *Nimmo* ex *Graham.*

Alpinia nutans, Roscoe, in Smith, Exot. Bot. v. 2 (1805) p. 93, t. 106, & in Trans. Linn. Soc. v. 8 (1807) p. 346. A very handsome plant grown commonly in gardens, a native of the Eastern Himalaya, Birma, Malay Islands and Peninsula; stem reaching 8–10 ft. high. Leaves 12–24 by 3–6 in., oblong-lanceolate. Flowers in panicles 6–12 in. long, with a very hairy rhachis; bracts large, concave, ivory-white with pink tips. Corolla white with a tinge of pink, the lip beautifully variegated with red and yellow. Fl. B. I. v. 6, p. 256; Grah. Cat. p. 206; Dalz. & Gibs. Suppl. p. 85; Roxb. in Asiat. Res. v. 11 (1810) p. 354; Fl. Ind. v. 1, p. 65; Watt, Dict. Econ. Prod. v. 1, p. 195. *Globba nutans*, Linn. Mantiss. 2 (1771) p. 170. *Zerumbet speciosum*, Wendl. Sert. Hann. v. 1, fasc. 4 (1798) t. 19. *Alpinia speciosa*, K. Schum. in Engl. Bot. Jahrb. v. 27 (1900) p. 284.—VERN. *Puna-champa*; *Nág-damani.*

DOUBTFULLY INDIGENOUS SPECIES.

ALPINIA CALCARATA, Roscoe, in Trans. Linn. Soc. v. 8 (1807) p. 347. Rootstock perennial, not tuberous. Leafing stem slender, 2–4 ft. high. Leaves 6–12 by 1–2 in., lanceolate, acuminate, green and glossy. Flowers numerous, large, in dense panicles

3-4 in. long; rhachis pubescent; bracts small, ovate. Calyx-tube funnel-shaped, ⅛–⅓ in. long. Corolla-segments ½ in. long. Lip 1–1½ in. long, ovate-oblong, sessile, yellow, streaked with purple veins, emarginate. Ovary densely pubescent; ovules many in each cell. Capsules globose, red. Fl. B. I. v. 6, p. 254; Wight, Icon. t. 2028 (by error in Tab. *A. nutans*); Grah. Cat. p. 206; Dalz. & Gibs. p. 274; Trim. Fl. Ceyl. v. 4, p. 249; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 338; Watt, Dict. Econ. Prod. v. 1, p. 192.

The plant is a native of China and the S. Malay Peninsula and is also given for Ceylon and the S. Konkan in Hook. f. Fl. B. I. l. c. Trimen (*l. c.*) says he has not seen the plant in Ceylon otherwise than in gardens, while the only authority for its presence in the S. Konkan is Nimmo ex Graham (Cat. Pl. Bo. l. c.). Dalzell & Gibson have not found the plant wild, neither have any other Bombay botanists. I think therefore that its existence as a wild plant in the Konkan is very problematical.

10. **PHRYNIUM,** Willd.

Herbs usually with creeping rootstocks. Leaves large, oblong, radical; petioles long, sheathing, simulating stems. Flowers in spikes produced from the side of the petiole or direct from the rootstock; bracts 2-more-flowered. Sepals 3, narrow. Corolla-tube cylindric, shorter or scarcely longer than the calyx; lobes linear-oblong, subequal, spreading. Staminal-tube longer than the corolla-tube; segments unequal, petaloid, one bearing a single marginal anther-cell. Ovary 3-celled; ovule usually solitary in each cell (rarely 2 of the cells empty); style adnate below to the staminal-tube, free and hooked above; stigma capitate or funnel-shaped. Fruit subglobose, indehiscent or tardily rupturing. Seeds 1–3, erect; aril short, fleshy; embryo curved.—DISTRIB. Species about 20, in the Tropics of the Old World.

Leaves 6-10 by 2-3 in.; flowers white, in short radical spikes ... 1. *P. spicatum.*
Leaves 12–18 by 6–8 in.; flowers purplish, in capitate spikes sessile on the side of the petiole above the middle ..... 2. *P. capitatum.*

1. **Phrynium spicatum,** *Roxb. Hort. Beng.* (1814) p. 1. Rootstock widely creeping, perennial, not tuberous. Leaves 2–4, oblong, 6–10 by 2–3 in., caudate-acuminate, base rounded; petioles slender, much longer than the blade. Flowers white, in short spikes 1–1½ in. long; bracts ¾ in. long, ovate, green. Sepals narrowly lanceolate, about ⅛ in. long. Corolla-tube ¾ in. long; lobes oblong, obtuse, ¼ in. long. Larger staminodes spathulate, ⅓ in. long, the inner much smaller. Stamen with a rather large appendage. Fruit 3-seeded. Seeds ¼ in. long, 3-quetrous on the inner face, dull brown. Fl. B. I. v. 6, p. 259; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521. *Stachyphrynium spicatum*, K. Schum. in Engler, Pflanzenreich, v. 4, part 48 (1902) p. 46.

Rare. KONKAN: *Law* !—DISTRIB. Pegu.

2. **Phrynium capitatum,** *Willd. Sp. Pl.* v. 1 (1797) p. 17. Rootstock tuberous, with many fleshy root-fibres. Leaves 12–18 by 6–8 in., oblong or oblong-lanceolate, acuminate, smooth on both sides, base rounded or cuneate; midrib slender; veins many, arched; petioles 2–3 ft. long, stout, terete; sheaths long, green. Flowers purplish, in capitate spikes 1½–2 in. in diam., sessile on the side of the petiole above the middle; outer bracts 2–3 at the base of the spike, large, rigid, with incurved scarious tips, breaking up into tufts of fibres; inner bracts closely imbricate, oblong, acute, 2–4-flowered; pedicels short. Sepals ⅜ in. long, linear, hairy. Corolla about 1 in. long; tube slender, funnel-shaped above; segments 3, purple, spathulate, recurved, the tips hairy.

Staminal-column 5-lobed, the 2 outer lobes larger, one orbicular, concave; filament adnate to the smaller segment; anther small. Ovary hairy; stigma funnel-shaped, hooked. Fruit size of a gooseberry, turbinate, 3-gonous, 3-valved. Seeds erect, subglobose; testa spongy; embryo curved. Fl. B. I. v. 6, p. 258; Grah. Cat. p. 212; Dalz. & Gibs. p. 271; Trim. Fl. Ceyl. v. 4, p. 263; K. Schum. in Engler, Pflanzenreich, v. 4, part 48 (1902) p. 53; Prain, Beng. Pl. p. 1049.

KONKAN: in shady jungles, *Dalzell & Gibson.*—DISTRIB. India (Bengal, Chota Nagpur, Travancore, W. Peninsula); Ceylon, Malaya.

11. **MUSA,** Linn.

Tree-like herbs with thick stems composed of convolute leaf-sheaths. Leaves very large, oblong. Flowers in subterminal stout spikes, the lower female, the upper male; bracts large, spathaceous, ovate or orbicular. Calyx tubular, spathaceous, slit down one side to the base, 3–5-lobed. Corolla a single convex membranous petal as long as the calyx and opposite its slit, embracing the base of the stamens and style. Stamens 5 perfect (6th rudimentary or 0); filaments erect, stout, filiform; anthers linear, erect, 2-celled. Ovary 3-celled; ovules many, superposed; style filiform from a thickened base; stigma subglobose, 6-lobed. Fruit large, oblong or fusiform, obtusely 3–5-angled, fleshy, indehiscent. Seeds embedded in pulp, subglobose or angled by pressure; in cultivated forms often obsolete.—DISTRIB. Species about 40, tropical.

Stoloniferous, 3–5 ft. high; root perennial; bracts few-flowered..	1. *M. rosacea.*
Not stoloniferous, 10–12 ft. high, dying after flowering; bracts many-flowered	2. *M. superba.*

1. **Musa rosacea,** *Jacq. Hort. Schoenb.* v. 4 (1804) p. 22, t. 445. Stem slender, cylindric, 3–5 ft. high, 3–4 in. in diam.; root perennial, stoloniferous. Leaves linear-oblong, firm in texture, petiolate. Flowers in drooping or erect spikes reaching 6 in. long; bracts few-flowered, ovate, lilac or reddish, about 6 in. long, oblong. Calyx about 1 in. long, yellowish-white, 5-toothed. Petal as long as the calyx. Fruit linear-oblong, slightly incurved, obscurely 4–5-angled, of the size of a man's finger, firm, not edible. Seeds many, black, tuberculate. Fl. B. I. v. 6, p. 263; Bot. Reg. t. 706; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 24. *Musa ornata,* Roxb. Hort. Beng. (1814) p. 19; Dalz. & Gibs. p. 272; Prain, Beng. Pl. p. 1050; Watt, Dict. Econ. Prod. v. 5, p. 290.

Grows in almost inaccessible places on the sides of precipitous crags in the Konkan hills.—DISTRIB. India (Eastern Himalaya, Chota Nagpur, Chittagong, W. Peninsula); Java.

2. **Musa superba,** *Roxb. Hort. Beng.* (1814) p. 19. Whole plant 10–12 ft. high; trunk not stoloniferous, 7–8 ft. in circumference at the base, narrowed to 3 ft. below the leaves. Leaves 5–10 by 2–3 ft., oblong, narrowed to the base; free petioles short. Flowers in 2 dense rows of 10–15 each, arranged in spikes which are at first globose, 1 ft. in diam., finally drooping and ⅓ the length of the trunk; bracts orbicular, reaching 1 ft. long and broad, dull claret-brown. Calyx 1–1½ in. long; lobes 3, linear, loosely cohering. Petal ½ in. long, pale, almost pellucid, the apex 3-lobed, the 2 side lobes rounded, the midlobe long,

linear. Fruit oblong, subcoriaceous, 3 by 1½ in., nearly dry when ripe. Seeds numerous, subglobose, angled by pressure, ⅓–½ in. in diam., smooth, brown or black. Fl. B. I. v. 6, p. 261; Dalz. & Gibs. p. 272; Roxb. Cor. Pl. t. 223; Wight, Icon. tt. 2017–18; R. Graham, in Bot. Mag. tt. 3849–3850; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 16; Watt, Dict. Econ. Prod. v. 5, p. 302. *Musa textilis*, J. Grah. Cat. Pl. Bo. (1839) p. 213 (*not* of Née).—VERN. *Chowáni*.

Widely spread throughout the Western Ghâts.

Musa textilis, Luis Née, in Ann. Ciénc. Nat. v. 4 (1801) p. 123. Stem cylindric, green, 20 ft. or more high, stoloniferous from the base. Leaves oblong, deltoid at the base, bright green above, rather glaucous beneath, smaller and firmer in texture than those of *Musa sapientum*; petioles 1 ft. long. Spike drooping, shorter than the leaves; male flowers deciduous; bracts polished outside. Fruit green, 2–3 by 1 in., 3-gonous, curved, with numerous seeds, not edible. Seeds turbinate, black, ⅛ in. in diam., angled by pressure. Fl. B. I. v. 6, p. 263; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521, & Gard. in Ind. ed. 5, p. 489; Watt, Dict. Econ. Prod. v. 5, p. 302; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 19. The plant is a native of the Philippines and furnishes the well-known *Manilla Hemp*. It has been introduced into India in several places, but has not proved a commercial success.

Musa coccinea, Andr. Bot. Rep. (1799) t. 47. Stem stoloniferous, slender, about 4 feet high, with oblong leaves 36 by 6 in. and spikes of flowers enclosed in bright scarlet bracts. A native of S. China and Cochinchina, grown in gardens as an ornamental plant. Woodr. Gard. in Ind. ed. 5, p. 488; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 23.

Musa sumatrana, Beccari, in Illustr. Hortic. v. 27 (1880) p. 37, t. 375. Whole plant 7–8 ft. high. Leaves with irregular blotches of claret-brown. A native of Sumatra, grown as an ornamental plant in conservatories. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521, & Gard. in Ind. ed. 5, p. 484; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 24.

Musa Ensete, J. F. Gmel. Syst. v. 2 (1791) p. 567. A very large species. Whole plant 30–40 ft. high; leaves oblong, acute, sometimes 20 by 3 ft. with a red midrib; bracts 9–12 in. long, dark claret-brown. A native of Abyssinia, the largest *Musa* known, grown as an ornamental plant in gardens. Its chief characteristic is the bright red of the massive midribs of the leaves. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521, & Gard. in Ind. ed. 5, p. 489; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 15.

Musa zebrina, Van Houtte, ex Planch. in Flor. des Serres, v. 10 (1854–55) p. 223. Whole plant 5–10 ft. high. Leaves oblong-lanceolate, green, striped with dark bands above, red beneath, a native of the Malay Peninsula, grown as an ornamental plant in gardens.

Baker (Fl. B. I. v. 6, p. 263) has made this a variety of *Musa sapientum*, to which Ridley objects and considers that it should more properly be made a variety of *M. malaccensis*, Ridley, or of *M. sumatrana*, Beccari. *Musa sapientum* var. *zebrina*, Bak. in Hook. f. Fl. B. I. v. 6, p. 263; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521. *Maranta zebrina*, Grah. Cat. p. 212.

Musa chinensis, Sweet, Hort. Brit. ed. 2 (1830) p. 596. Whole plant 4–6 ft. high; leaves 6–8 in a dense rosette, spreading, oblong, 2–3 by 1 ft.; petioles short, stout, deeply channelled, with broad crisped green edges. Spike dense, 1–2 ft. long; bracts red-brown; male flowers persistent. Fruit 6-angled, 4–5 in. long, yellow, with a thick skin, of inferior flavor until dead ripe, when it is rich. *Musa Cavendishii*, Lambert, ex Paxt. Mag. Bot. v. 3 (1837) p. 51; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521, & Gard. in Ind. ed. 5, p. 486; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 17. A native of S. China, extensively cultivated in tropical and subtropical countries and known as the *Chinese* or *Dwarf Banana*.—VERN. *Gugi*.

Musa paradisiaca, Linn. Sp. Pl. (1753) p. 1043. Stoloniferous; trunk cylindric, reaching 25 ft. or more, with a diameter of 6 in. Leaves oblong, green, reaching 8 ft. long and 2 ft. broad. Inflorescence pendulous, reaching 4 ft. long; male flowers and bracts subpersistent. Fruit cylindric, up to 12 in. long, generally yellowish or yellowish-green when ripe, the pulp scarcely sweet, rather firm, not fit to eat without cooking. Trim. Fl. Ceyl. v. 4, p. 265; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 19. *Musa paradisiaca* var. *normalis*, O. Kuntze, Revis. Gen. v. 2 (1891) p. 692. *Musa Cliffortiana*, Linn. Sp. Pl. (1753) p. 1043 in syn. *M. sapientum* var. *paradisiaca*, Baker, in Ann. Bot. v. 7 (1893) p. 213, & in Hook. f. Fl. B. I. v. 6, p. 262; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; Prain, Beng. Pl. p. 1050; Watt, Dict. Econ. Prod. v. 5, p. 292.

The well-known *Plantain* or *Banana*, usually known by the former name in India, many varieties of which are cultivated for their fruit throughout the tropics. Its native country is uncertain, but it is probably of Asiatic origin. I have followed O. Kuntze and K. Schumann in making *M. paradisiaca*, Linn., the type and *M. sapientum*, Linn., the subspecies or variety. Mr. Baker (Ann. Bot. l. c.) has made *M. sapientum* the type and *M. paradisiaca* a subspecies, but he has done so apparently under the mistaken notion that the names of both plants occurred *for the first time* in Linnæus's Sp. Pl. ed. 2 (1763) p. 1477, where they appear together. As a matter of fact, however, *Musa paradisiaca* appears *for the first time* in Linnæus's first edition (1753) on page 1043, in which *M. sapientum* does not occur at all, while *Musa sapientum* appears *for the first time* in Linn. Syst. ed. 10 (1759) p. 1303, where *M. paradisiaca* occurs above it. As *M. paradisiaca* has 6 years' priority to *M. sapientum*, there can be no question that to make it a subspecies of the latter would, unless some very cogent reason could be assigned, be somewhat anomalous.

SUBSPECIES *sapientum*, K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 20. Male flowers and bracts deciduous; fruit oblong, usually 3-gonous, yellow or reddish when ripe, the pulp sweet and edible without cooking. *Musa paradisiaca* var. *sapientum*, O. Kuntze, Revis. Gen. v. 2, p. 692. *M. sapientum* (sp.), Linn. Syst. ed. 10 (1759) p. 1303; Baker, in Hook. f. Fl. B. I. v. 6, p. 262; Grah. Cat. p. 212; Dalz. & Gibs. Suppl. p. 88; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; Prain, Beng. Pl. p. 1050; Watt, Dict. Econ. Prod. v. 5, p. 290.—VERN. *Kela*.

VAR. *vittata*, Hook. in Bot. Mag. t. 5402. Leaves and long fruits striped with white; bracts bright red inside. Imported from the Island of St. Thomas (W. Africa) and grown as an ornamental plant in gardens. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521, & Gard. in Ind. ed. 5, p. 489; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 21.

Several forms or varieties of the subspecies (*M. sapientum*) are cultivated in W. India for their fruit. Of these the chief are the following, which, with the vernacular names by which they are known, have been taken from Woodrow's Gard. in Ind. ed. 5, p. 486:—

Raj-kel; *Rám-kela*; *Lál-kela*. Stem very strong, reddish, of medium height; leaves with red midrib and edges; fruit very large, subcylindric, red-skinned, of luscious flavor. Grown largely about Bassein, 30 miles N. of Bombay.

Son-kel (var. *Champa*, Hort.). Stem very tall, weak; leaves thin, large; fruit small, subcylindric, yellow, thin-skinned, of excellent flavor. Considered to be the best of the plantains grown in the Bombay Presidency.

Gossavi. Stem of medium height; fruit of medium size, yellow, thin-skinned, of superior flavor.

Botatti. Stem tall, stout; fruit 3-gonous, thick-skinned, yellow, of sweet flavor.

Lokandi. Stem 10 ft. high, reddish, stout; leaves thick, large; fruit long, subcylindric, yellow, with moderately thick skin, and of superior flavor.

The following plants not belonging to any of the foregoing genera are grown as useful or ornamental plants:—

Heliconia angustifolia, Hook. Bot. Mag. (1849) t. 4475. A native of Brazil, grown as an ornamental plant in gardens; leaves with long petioles gracefully arching; flowers white with greenish tips; bracts scarlet, lanceolate, acuminate. K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 39. *Heliconia bicolor*, Benth. in Maund, Bot. v. 3, t. 101; Woodr. Gard. in Ind. ed. 5, p. 490.

Heliconia metallica, Planch. & Linden, in Bot. Mag. (1862) t. 5315. A native of New Granada. Leaves elegantly drooping and recurved, broadly lanceolate, the underside, midrib, margins and curving veins of a dark bronzy red; flowers scarlet. Woodr. Gard. in Ind. ed. 5, p. 490. *Heliconia vinosa*, Bull, Cat. (1871) p. 5.

Heliconia Bihai, Linn. Mantiss. v. 2, p. 211. A native of the West Indies, introduced by Nimmo in 1833. It reaches about 12 ft. high, with ovate-lanceolate leaves on long petioles and red or orange bracts enclosing the flowers. Woodr. Gard. in Ind. ed. 5, p. 490. *Heliconia buccinata*, Roxb. Hort. Beng. (1814) p. 19; Grah. Cat. p. 213; Dalz. & Gibs. Suppl. p. 89; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521.

Ravenala madagascarensis, Sonnerat, Voy. v. 3 (1782) Bk. 5, p. 244. A very elegant tree known as the *Traveller's Tree*, with plantain-like leaves on long petioles forming a fan-like head; flowers white. A native of Madagascar, grown in gardens, but it does not thrive at any great distance from the coast. Fl. B. I. v. 6, p. 198; K. Schum. in Engler, Pflanzenreich, v. 4, part 45 (1900) p. 29, fig. 6; Prain, Beng. Pl. p. 1050. *Urania speciosa*, Willd. Sp. Pl. v. 2 (1799) p. 7; Grah. Cat. p. 213; Dalz. & Gibs. Suppl. p. 89.

Canna indica, Linn. Sp. Pl. (1753) p. 1. Rootstock tuberous with many fibres; stem 3–4 ft. high. Leaves 6–18 by 4–8 in., oblong- or elliptic-lanceolate, caudate-acuminate. Flowers rather distant, 2–2½ in. long, scarlet or yellow. Fruit erect, ½–1 in. long, subglobose or oblong, obscurely 3-lobed. Seeds the size of a pea, spherical; testa crustaceous, black, shining. The seeds are commonly known as the *Indian Shot*. Flowers more or less throughout the year. In gardens in the Bombay Presidency very common, but not indigenous. Fl. B. I. v. 6, p. 260; Grah. Cat. p. 211; Dalz. & Gibs. Suppl. p. 88; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; Prain, Beng. Pl. p. 1047; Watt, Dict. Econ. Prod. v. 2, p. 102.

Elettaria Cardamomum, Maton, in Trans. Linn. Soc. v. 10 (1811) p. 254. Rootstock woody or fleshy, branching; stem 6–9 ft. high, clothed below with spongy sheaths. Leaves subsessile, 1–2 ft. by 3 in., oblong-lanceolate. Panicles several to one leafy stem, 1–2 ft. long; bracts linear-oblong, persistent, 1½–2 in. long. Calyx ½ in. long. Lip of corolla white, streaked with violet. Capsules subglobose or oblong, about ½ in. long, marked with many fine vertical ribs. Fl. B. I. v. 6, p. 251; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521, & Gard. in Ind. ed. 5, p. 482; K. Schum. in Engler, Pflanzenreich, v. 4, part 46 (1904) p. 268; Watt, Dict. Econ. Prod. v. 3, p. 227. *Alpinia Cardamomum*, Roxb. in Asiat. Res. v. 11 (1810) p. 355; Grah. Cat. p. 206; Dalz. & Gibs. Suppl. p. 86.—Flowers: Jan. VERN. *Elchi*; *Elachi*.

The Cardamom; cultivated in the hilly tracts of N. Kanara and in many parts of S. India. A very full description may be found in Watt's Dictionary, l. c.

ORDER CXXVII. BROMELIACEÆ.

Of this Order there exists but one representative in the Bombay Presidency, the *Pine Apple*, *Ananas sativus*, Schult., a native of Tropical America, often cultivated. *Ananas sativus*, Schult. f. Syst. v. 7 (1830) p. 1283; Watt, Dict. Econ. Prod. v. 1, p. 236. *Ananassa sativa*, Lindl. Bot. Reg. v. 13 (1827) sub t. 1068; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; Prain, Beng. Pl. p. 1052. *Bromelia Ananas*, Linn. Sp. Pl. (1753) p. 285; Grah. Cat. p. 222; Dalz. & Gibs. Suppl. p. 94; Bot. Mag. t. 1554.—Flowers: Jan.–Mar. VERN. *Ananas*.

Order CXXVIII. HÆMODORACEÆ.

Perennial herbs; rootstock short, tuberous, with usually fascicled root-fibres. Leaves usually radical, often distichous, narrow, with equitant sheaths; nerves parallel. Flowers hermaphrodite, regular or nearly so, in terminal spikes, racemes or panicles. Perianth corolline, 2-seriate; lobes 6, imbricate or induplicato-valvate. Stamens 6, opposite or more or less adnate to the perianth-lobes, or fewer; anthers erect or versatile, 2-celled, rarely opening by pores. Ovary inferior or sub-inferior, perfectly or imperfectly 3-celled; ovules 1 or more, attached to the inner angle of the cells; style filiform (rarely short or obsolete); stigma simple or 3-notched. Fruit a superior or nearly superior loculicidal capsule, or an inferior indehiscent berry tipped by the perianth. Seeds various; embryo small, partially enclosed in fleshy albumen.—Distrib. Genera 26; species about 120, in Australia, S. Africa, N. and S. America, Central and Eastern Asia.

1. **OPHIOPOGON,** Ker-Gawl.

Scapigerous herbs. Stems short from a short rootstock, or elongate and subscandent. Leaves linear or lanceolate, parallel-nerved. Flowers in racemes; scape leafy or naked; bracts scarious, usually many-flowered. Perianth superior; segments spreading. Stamens 6, on the bases of the perianth-segments; filaments short, erect; anthers basi-fixed. Ovary inferior, 3-celled, the crown flat or depressed; ovules 2 in each cell, collateral, erect, anatropous; style columnar; stigma 3-toothed. Fruit indehiscent. Seeds few; testa fleshy or succulent.—Distrib. Species 8 or 10, East Asiatic.

1. **Ophiopogon intermedius,** *Don, Prodr. Fl. Nep.* (1825) p. 48. Var. **pauciflora,** *Hook. f. Fl. B. I.* v. 6 (1892) p. 269. Rootstock short. Leaves 6–20 by $\frac{1}{12}$–$\frac{1}{3}$ in., linear, acute or acuminate, dark green above, paler beneath. Flowers white, rather distant, in lax racemes 1–2 in. long, on very long slender scapes 4–10 in. long; bracts narrowly lanceolate, variable in length, sometimes as much as $\frac{1}{2}$ in. long; pedicels $\frac{1}{10}$–$\frac{1}{6}$ in. long. Perianth campanulate, $\frac{1}{4}$ in. long; segments $\frac{1}{6}$ by $\frac{1}{10}$ in., elliptic-oblong, obtuse. Anthers narrowly oblong. Seeds subglobose, $\frac{1}{3}$ in. in diam., crowded round and almost concealing the small withering pericarp; testa soft, blue. *Ophiopogon intermedius,* Trim. Fl. Ceyl. v. 4, p. 267; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521. *O. indicus,* Wight, Icon. v. 6 (1853) p. 26, t. 2050.—Flowers: Sept.

Not common. *Dalzell* without locality in Herb. Kew.!; *Stocks* without locality in Herb. Kew.! Deccan: Mahableshwar, *Woodrow.*—Distrib. India (Khasia Hills, W. Peninsula); Ceylon.

Sansevieria zeylanica, Willd. Sp. Pl. v. 2 (1799) p. 159. Stem very short. Leaves about 8 or 9 in a tuft, 2½–3 ft. long by 1 in. broad towards the middle, suberect, rigid, pale green with transverse bands of dark green, $\frac{1}{4}$ in. thick, with a terete rigid spine-like tip 1–2 in. long. Flowers greenish-white tinged with violet, in fascicles of 3–6 on long racemes 1–2 ft. long.

The *Bow-string Hemp*, sometimes but not very commonly grown in gardens. It does not produce seed in the Bombay Presidency. The fibre is excellent and very strong, used for fishing-lines and bow-strings. Grah. Cat. p. 218; Dalz. & Gibs. Suppl. p. 91; Trim. Fl. Ceyl v. 4, p. 267; Roxb. Cor. Pl. v. 2, p. 43, t. 184; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Watt, Dict. Econ. Prod. v. 6, part 2, p. 460. *Sansevieria Roxburghiana*, Schultz, f. Syst. v. 7 (1829) p. 357; Hook. f. Fl. B. I. v. 6, p. 271; Bot. Mag. t. 7487; Prain, Beng. Pl. p. 1054.—Flowers: Jan. VERN. *Murba*; *Murva*; *Naghin*.

DISTRIB. India (usually cultivated; said to be indigenous on the Coromandel coast); Ceylon, Java, China, Africa.

Sansevieria cylindrica, Boj. Hort. Maurit. (1837) p. 349. The *terete-leaved Bow-string Hemp*, a native of Tropical Africa. Leaves terete, quite solid; flowers cream-white tinged with pink, in fascicles along the rhachis of a long raceme. Occasionally cultivated in gardens. Hook. in Bot. Mag. t. 5093; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Prain, Beng. Pl. p. 1054.

EXCLUDED SPECIES.

PELIOSANTHES NEILGHERRENSIS, Wight, Icon. v. 6 (1853) p. 26, t. 2052. Leaves membranous, 3–8 in a tuft from the base of the plant, 4½–8 by ¾–1½ in., oblong-lanceolate, acuminate, base acute; nerves slender, 10–15, of which 5 are stronger than the others, the transverse nervules conspicuous; petioles 4–8 in. long, slender. Flowers dark purple, measuring ⅝ in. across when spread out, secund, in racemes 8–12 in. long (including the scape); bracts 1-flowered, ovate-lanceolate, acuminate, scarious, the tips inflexed, the lower bracts reaching ½ in., the upper ⅛–⅜ in. long; pedicels ⅛–¼ in. long, articulated at the apex, cernuous. Perianth-segments 6, oblong, obtuse, about ⅛ in. long. Mouth of corona 6-toothed. Stigma 3-lobed. Seeds obturbinately ovoid, ¼–⅜ in. long. Fl. B. I. v. 6, p. 266; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 521; Baker, in Journ. Linn. Soc. v. 17 (1880) p. 593.

In the 'Flora of British India' Kanara is given as a habitat of this plant on Wight's reputed authority. Woodrow in his list of Bombay Plants copies the 'Flora of British India' and also gives Kanara, *Wight*. But Wight does not anywhere give Kanara as a habitat. In his 'Icones' (*l. c.*) he gives Sispara, and Steudel (Herb. No. 1306) also gives Sispara, which is on the Nilghiris at an elevation of about 6000 feet. There is absolutely no evidence of the existence of the plant in the Bombay Presidency.

ORDER CXXIX. AMARYLLIDACEÆ.

Perennial herbs (rarely shrubs or undershrubs). Rootstock a bulb, tuber or corm, rarely an erect stock. Leaves radical. Scape naked (in the Indian genera). Flowers few, often umbellate; bracts membranous or colored (rarely herbaceous), the outer under the umbel 1–3 (rarely many) -involucrate; occasionally the inflorescence racemose or paniculate with scattered bracts. Perianth regular or irregular, 2-seriate, 6-lobed or -partite, sometimes with a corona at the mouth of the tube. Stamens 6, adnate to the bases of the perianth-segments, rarely epigynous; filaments free or connate; anthers erect or versatile. Ovary 3-celled, inferior; ovules many, anatropous, 2-seriate on the inner angles of the cells; style slender; stigma simple or 3-cleft. Fruit inferior, usually

a loculicidal capsule, rarely fleshy and bursting irregularly. Seeds few or many; albumen fleshy, enclosing the small embryo.—DISTRIB. Genera 64; species about 650, in temperate and tropical regions.

Rootstock tuberous; leaves strongly nerved, flat or plicate; flowers spicate or racemose; perianth yellow, not showy.	
Fruit opening at the top as a circumscissile or 3-valved capsule; ovary not produced above the crown into a stipe supporting the perianth	1. HYPOXIS.
Fruit indehiscent; ovary often produced into a stipe between the crown and the base of the perianth-lobes	2. CURCULIGO.
Rootstock a tunicated bulb; leaves not strongly nerved, flat, smooth; flowers at the apex of a scape, usually umbellate; perianth white or pink, not yellow, large and showy.	
Filaments attached to the perianth-lobes but not connate	3. CRINUM.
Filaments united towards their base by an intervening petaloid membrane	4. PANCRATIUM.

1. **HYPOXIS,** Linn.

Herbs with a tuberous rootstock or a tunicate membranous or fibrous corm. Leaves narrow, radical, strongly nerved. Flowers solitary, or racemose, or umbellate; bracts small, linear, or obsolete. Perianth rotate, 6-partite, persistent, sessile on the top of the inferior ovary. Stamens 6, adnate to the base of and shorter than the perianth-segments; filaments short; anthers erect, dorsifixed. Ovary inferior, 3-celled; ovules many, 2-seriate in each cell; style short, columnar; stigmas 3, erect, stout, distinct or connate. Fruit a globose or oblong capsule, opening by 3 valves or circumscissilely. Seeds globose; testa crustaceous, shining, beaked at the tip.—DISTRIB. Species about 50, widely diffused but rare in Asia; numerous in S. Africa.

1. **Hypoxis aurea,** *Lour. Fl. Cochinch.* (1790) p. 200. Dicœcious; rootstock subglobose, or elongate and erect, crowned with the fibrous remains of old leaves. Leaves 6–12, narrowly linear, 4–14 by $\frac{1}{10}$–$\frac{1}{8}$ in., subcoriaceous, acute, keeled. Scapes 1–4, filiform, 1–4 in. long, 1 (less commonly 2) -flowered, nearly glabrous or sparsely clothed with pale brown hairs; bracts setaceous. Ovary broadly clavate, $\frac{1}{8}$–$\frac{1}{4}$ in. long, clothed with golden-brown short shining hairs. Perianth-segments $\frac{1}{4}$–$\frac{1}{3}$ in. long, thinly hairy, elliptic-lanceolate, yellow, the outer green at the back. Anthers sagittate. Capsules with thin walls, oblong or clavate-oblong, $\frac{1}{4}$–$\frac{1}{2}$ in. long, ultimately 3-valved, crowned with the erect perianth-segments. Seeds black, finely tuberculate. Fl. B. I. v. 6, p. 277; Baker, in Journ. Linn. Soc. v. 17 (1880) p. 108; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Prain, Beng. Pl. p. 1058. *Curculigo graminifolia,* Nimmo, ex Grah. Cat. Pl. Bo. (1839) p. 215; Dalz. & Gibs. p. 276.—Flowers: July.

KONKAN: Shivnar Fort, *Dalzell & Gibson.* DECCAN: *Dalzell,* 10!; Khandala, *Graham, Dalzell & Gibson, Woodrow*; Purandhar, *Dr. Barnes*!; Mahableshwar, *H. M. Birdwood.* S. M. COUNTRY: Belgaum, *Ritchie,* 1443!, *Talbot,* 2276! KANARA: *Law*!—DISTRIB. Throughout India in hilly parts; Java, China, Japan, Philippines.

2. **CURCULIGO,** Gærtn.

Herbs with a tuberous rootstock or a tunicate corm. Leaves lanceolate and plicate, or linear and flat, often large. Flowers spicate, racemose

or subcapitate, the lower flowers usually 2-sexual, the upper often male. Perianth 6-partite, separated from the ovary by a short or long solid stipe bearing the rotate limb. Stamens 6, adnate to the base of the perianth-lobes; filaments short; anthers linear, erect. Ovary inferior, 3-celled, with a short or long beak; ovules 2 or more in each cell, with a distinct, often long funicle; style short, columnar; stigmas 3, oblong, erect, appressed. Fruit an indehiscent berry. Seeds subglobose; testa crustaceous, black, often beaked.—DISTRIB. Species about 12, tropical.

1. **Curculigo orchioides,** *Gærtn. Fruct.* v. 1 (1788) p. 63, t. 13. Rootstock stout, short or elongate (sometimes 1 ft. long), with copious fleshy root-fibres. Leaves sessile or petiolate, 6–18 by ½–1 in., linear or linear-lanceolate, membranous, plicate, glabrous or sparsely softly hairy, the tips sometimes rooting and reaching the ground, base sheathing. Scape very short, clavate, flattened, with the pedicels, bracts, and ovary hidden among the leaf-sheaths. Flowers bright-yellow, distichous, the lowest in the raceme 2-sexual, the upper male; bracts lanceolate, membranous. Perianth-segments ½–⅔ in. long, elliptic-oblong, acute, hairy on the back, the stipes (the long slender beak of the ovary) very slender, ½–1 in. long, which alone with the perianth appears above ground. Stamens small; filaments very short; anthers linear. Ovary lanceolate, the cells 6–8-ovulate; stigma 3-cleft. Capsules ½ in. long, hypogæous, 1–4-seeded, with a slender beak; septa spongy. Seeds oblong; testa deeply grooved in wavy lines, black, shining. Fl. B. I. v. 6, p. 279; Grah. Cat. p. 215; Trim. Fl. Ceyl. v. 4, p. 269; Roxb. Cor. Pl. v. 1 (1795) p. 14, t. 13; Bot. Mag. t. 1076; Baker, in Journ. Linn. Soc. v. 17 (1880) p. 124; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Prain, Beng. Pl. p. 1059; Watt, Dict. Econ. Prod. v. 2, p. 650. *Curculigo malabarica,* Wight, Icon. v. 6 (1853) p. 22, t. 2043, fig. 1; Dalz. & Gibs. p. 276. *Curculigo brevifolia,* Dryand. in Ait. Hort. Kew. ed. 2, v. 2 (1811) p. 253; Wight, Icon. t. 2043, fig. 2; Grah. Cat. p. 215; Dalz. & Gibs. p. 276.

KONKAN: *Law!*; S. Konkan, *Nimmo* ex *Graham.* DECCAN: Mahableshwar, *Graham, Dalzell & Gibson, H. M. Birdwood.* KANARA: *Law!*—DISTRIB. India (Bengal, Assam, W. Peninsula); Java.

Curculigo recurvata, Dryand. in Ait. Hort. Kew. ed. 2, v. 2 (1811) p. 253. Leaves large, 2–3 ft. by 3–6 in., lanceolate, plicate; petiole 1 ft. long; flowers yellow, ¾ in. across, in heads 2–4 in. in diam. Occasionally grown in gardens, a native of the Tropical Himalaya, Bengal, Birma, Malay Islands, China, and Australia. Fl. B. I. v. 6, p. 278; Bot. Reg. t. 770; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Prain, Beng. Pl. p. 1059.

3. **CRINUM,** Linn.

Herbs with large tunicated bulbs, the bulbs often produced into a long or short neck. Leaves numerous, elongate, lorate or ensiform. Scape solid. Flowers large, umbellate; bracts 2, spathe-like; bracteoles linear. Perianth funnel- or salver-shaped; tube long, straight or incurved; lobes 6, linear-lanceolate or oblong, spreading or conniving.

Stamens 6, on the throat of the perianth-tube; filaments free, filiform; anthers linear, dorsifixed. Ovary 3-celled; ovules few or many in a cell; style filiform; stigma minute, subcapitate. Capsule irregularly subglobose, membranous or coriaceous, bursting irregularly. Seeds few, large, rounded; testa thick; albumen copious, fleshy.—DISTRIB. Tropical Asia, Africa, Australia, and America; species about 75.

Perianth erect, salver-shaped; lobes stellately patent; stamens very long, spreading.	
Perianth-lobes linear.	
Leaves 5–7 in. wide; umbels 15–20-flowered; perianth-tube 3–4 in. long	1. *C. asiaticum.*
Leaves ¾–1 in. wide; umbels 6–12-flowered; perianth-tube 2½–3 in. long	2. *C. defixum.*
Perianth-lobes lanceolate.	
Leaves 1–2 in. wide; flowers subsessile; bracts 2–3 in. long	3. *C. pratense.*
Leaves 3–4 in. wide; pedicels 1 in. long; bracts less than 2 in. long	4. *C. Woodrowi.*
Perianth funnel-shaped; tube curved; lobes oblong or lanceolate; stamens very long, declinate; style longer than the filaments	5. *C. latifolium.*
Perianth nodding, funnel-shaped; stamens very short; filaments ½ in. long; style shorter than the filaments, included in the tube	6. *C. brachynema.*

1. **Crinum asiaticum,** *Linn. Sp. Pl.* (1753) p. 292. Bulb 2–4 in. in diam., narrowed into a neck 6–12 in. long, which is clothed with old leaf-sheaths. Leaves 20–30, thin, 3–5 ft. by 5–7 in., linear-lanceolate, shortly acuminate, flat, narrow, with a sheathing base, bright-green with smooth margins. Scape 1½–3 ft., reaching 1 in. in diam. Flowers white, fragrant at night, 15–50 in an umbel; bracts 3–4 in. long; pedicels ¼–1 in. long. Perianth-tube greenish-white, 3–4 in. long, cylindric, slender; lobes nearly as long as the tube, linear, recurved or revolute. Stamens reddish; filaments slender, shorter than the lobes of the perianth; anthers ½–¾ in. long. Fruit subglobose, 1–2 in. in diam., 1 (rarely 2)-seeded, beaked by the fleshy base of the perianth, dehiscing irregularly. Fl. B. I. v. 6, p. 280; Grah. Cat. p. 215; Dalz. & Gibs. p. 275; Baker, Handb. Amaryllid. (1888) p. 75; Bot. Mag. t. 1073; Trim. Fl. Ceyl. v. 4, p. 270; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Prain, Beng. Pl. p. 1060. *Crinum asiaticum* var. *toxicaria,* Watt, Dict. Econ. Prod. v. 2, p. 589. *Crinum toxicarium,* Roxb. Fl. Ind. v. 2 (1832) p. 134; Wight, Icon. tt. 2021–2; Grah. Cat. p. 216.—VERN. *Nagdaun.*

Often cultivated in gardens, but rather doubtfully indigenous. KONKAN: N. & S. Konkan, *Graham, Dalzell & Gibson.*

2. **Crinum defixum,** *Ker-Gawl, in Journ. Sci. & Arts,* v. 3 (1817) p. 105. Bulb ovoid, 2–3 in. in diam., with a fusiform stoloniferous base; neck 2–6 in. long, cylindric. Leaves 6–8 to a bulb, 2–3 ft. by ¾–1 in., linear, deeply channelled down the face, obtuse or acute, concave, thick, dark-green, with slightly rough margins. Scapes from the axils of the lowest leaves, 1½–2½ ft. long, erect, cylindric; bracts 2, oblong-lanceolate, subacute, 1½–2 in. long; bracteoles filiform. Flowers white, fragrant at night, in 6–12-flowered umbels; pedicels very short. Perianth-tube 2½–3 in. long, slender, cylindric; lobes nearly as long as

the tube, narrowly linear. Filaments shorter than the lobes of the perianth, spreading, bright-red; anthers ½ in. long. Style declinate; stigma simple. Fruit subglobose, 1–1½ in. in diam., shortly pedicellate, beaked by the perianth-tube, 1-celled, 1- or more-seeded. Seeds rugose. Fl. B. I. v. 6, p. 281; Bot. Mag. t. 2208; Trim. Fl. Ceyl. v. 4, p. 271; Baker, Handb. Amaryllid. (1888) p. 76; Prain, Beng. Pl. p. 1060; Watt, Dict. Econ. Prod. v. 2, p. 590. *Crinum Roxburghii*, Dalz. & Gibs. Bo. Fl. (1861) p. 275. *C. ensifolium*, Roxb. Hort. Beng. (1814) p. 23; Fl. B. I. v. 6, p. 281; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522. *C. asiaticum*, Roxb. Fl. Ind. v. 2 (1832) p. 127 (*not* of Linn.).—Flowers: Aug.–Sept.

Ritchie, 1444, without locality in Herb. Kew.! KONKAN: N. & S. Konkan, *Law*! S. M. COUNTRY: Belgaum, *Ritchie*, 724! KANARA: Kála naddi, *Ritchie*, 724!

3. **Crinum pratense,** *Herbert, Amaryllid.* (1837) p. 256. Bulb ovoid, 4–5 in. in diam.; neck 2–2½ in. long. Leaves 6–8 to a bulb, 1½–2 ft. by 1–2 in., narrowed towards the obtuse or subacute apex, linear, suberect, channelled down the face, the margins entire or ciliolate. Scape lateral, compressed, 12 in. or more long and about ½ in. in diam. Flowers fragrant, 6–12 in an umbel, subsessile; bracts large, 2–3 in. long, ovate-deltoid, acute. Perianth-tube greenish, 3–4 in. long, at first curved; lobes lanceolate, white, about as long as the tube, ½ in. broad. Filaments bright-red, rather shorter than the perianth-lobes. Ovules 3–4 in each cell. Fl. B. I. v. 6, p. 282; Baker, Handb. Amaryllid. (1888) p. 82; Prain, Beng. Pl. p. 1060; Watt, Dict. Econ. Prod. v. 2, p. 590. *Crinum longifolium*, Roxb. Hort. Beng. (1814) p. 23.

Dalzell without locality in Herb. Kew.! S. M. COUNTRY: Belgaum, on banks of nálas, *Ritchie*, 1445!—DISTRIB. Plains of India and Birma.

4. **Crinum Woodrowi,** *Baker, in Bot. Mag.* (1898) t. 7597. Bulb globose, 4 in. in diam., without any produced neck; outer tunics brown, membranous. Leaves 1 ft. by 3–4 in., few, contemporary with the flowers, linear, obtuse, glabrous, bright-green, not ciliate on the margin. Scape arising from the bulb outside the tuft of leaves, stout, compressed, 1 ft. long. Umbels 6–7-flowered; pedicels about 1 in. long; bracts 1½–1¾ in. long, ovate, acute. Perianth-tube 3–3½ in. long, cylindric, greenish; lobes white, as long as the tube, lanceolate, spreading equally. Filaments bright-red, shorter than the perianth-lobes; anthers linear, ¾ in. long, yellow. Style overtopping the stamens. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522.—Flowers: May–June.

DECCAN: Mahableshwar, *Woodrow.*

The bulbs of this plant were sent to Kew by Mr. G. M. Woodrow, who obtained them from Mahableshwar, supposing them to be the bulbs of *Crinum brachynema*. The bulbs flowered at Kew and the plant proved to be a new species. The above description is that of Mr. Baker made from the Kew-grown specimens.

5. **Crinum latifolium,** *Linn. Sp. Pl.* (1753) p. 291. Bulb large, subglobose, 5–6 in. in diam.; neck short, stout. Leaves numerous, 2–3 ft. by 3–5 in., lorate, acuminate, bright-green, the margins slightly scabrous. Scape inserted on the neck of the bulb, about as long as the leaves, stout, tinged with purple. Flowers fragrant, white, streaked or tinged with purple down the middle, in 10–20-flowered umbels; pedicels very short; bracts 3–4 in. long, oblong-lanceolate. Perianth-tube

3–6 in. long, curved, cylindric; lobes 3–4 by 1 in., oblong-lanceolate, acute, much longer than the stamens. Stamens declinate, much shorter than the perianth-lobes; filaments 2½–3 in. long; anthers ½–¾ in. long, grey. Style longer than the stamens. Ovary with 5–6 superposed ovules in each cell. Fruit subglobose, 1½–2 in. in diam. Fl. B. I. v. 6, p. 283; Grah. Cat. p. 216; Wight, Icon. tt. 2019–20; Trim. Fl. Ceyl. v. 4, p. 271; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Prain, Beng. Pl. p. 1060; Baker, Handb. Amaryllid. (1888) p. 87. *Crinum zeylanicum*, Linn. Syst. ed. 12 (1767) p. 236; Watt, Dict. Econ. Prodr. v. 2, p. 591. *C. ornatum*, Herbert, Amaryllid. (1837) p. 262; Bot. Mag. t. 1171. *C. ornatum* var. *latifolium* and *Herbertianum*, Herbert, Amaryllid. p. 263.—Flowers: May–June.

KONKAN: *Ritchie*!; N. & S. Konkan, rare, *Nimmo* ex *Graham*. DECCAN: Lanoli, *Woodrow*; Panchgani, *Woodrow*. KANARA: banks of the Kála naddi, *Ritchie*!—DISTRIB. Throughout India, Birma, and Ceylon, wild or cultivated.

VAR. *zeylanica*, Herbert, Amaryllid. (1837) p. 262. Bulb 6–8 in. in diam.; leaves fewer, narrower, 1½–2 in. wide, shorter, with smooth undulate margins; flowers pinkish; anthers brown. Prain, Beng. Pl. p. 1061. *C. zeylanicum* (sp.), Linn. Syst. ed. 12, v. 2 (1767) p. 236; Grah. Cat. p. 216.—Flowers: July.

Wild in both Konkans, *Graham*.

6. **Crinum brachynema,** *Herbert, in Bot. Reg.* (1842) *Misc.* p. 36. Bulb ovoid, 2½–3 in. in diam., without a distinct neck. Leaves not developed till after the flowers, 1½–2 ft. by 3–4 in., lorate, bright-green, moderately firm, with entire margins. Scape about 1 ft. high, subterete. Flowers pedicellate, 15–20 in an umbel, fragrant; bracts lanceolate, 1½–2 in. long, greenish. Perianth-tube not much curved, greenish, 1½–2 in. long; lobes 2 by ¾ in., pure white, oblanceolate, obtuse, cuspidate. Filaments ¼ in. long; anthers ¼–⅜ in. long, oblong, yellow. Style shorter than the filaments, included in the tube. Easily distinguished by the short stamens and style. Fl. B. I. v. 6, p. 284; Baker, Handb. Amaryllid. (1888) p. 88; Bot. Mag. t. 5937; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522.—Flowers: May.

Stocks without locality in Herb. Kew.! DECCAN: Mahableshwar, *Cooke*!, *Woodrow*, *Lady Reay*.

Very common in the open jungle on the Mahableshwar Hills, where the naked scapes appear in May as soon as the mists come on the hills before the rains. It is very abundant on the hills, and the bulbs with their flowers are hawked about for sale by the hill coolies. The plant has been grown at Kew from a bulb sent to England by Lady Reay (wife of a former Governor of Bombay) in December 1888. It is worthy of a place in conservatories, and the supply of bulbs from Mahableshwar would be practically inexhaustible.

CRINUM AUGUSTUM, Dalz. & Gibs. Bo. Fl. (1861) p. 275. Bulb columnar, mostly above ground. Leaves lanceolate, channelled, linearly tapering, 3–5 ft. long and 3–4 in. broad; scapes lateral, from the axils of the outermost leaves and nearly as long; umbels composed of 30–40 pedicellate flowers, white or rosy, fragrant; tube of corolla 2½–5 in. long. On the banks of the Gatprabha and Malpurba rivers.

The above is Dalzell & Gibson's description, from which I fail to identify the plant. There are no specimens in Dalzell's Herbarium in Herb. Kew.

Crinum augustum, Roxb. Hort. Beng. p. 23, is a native of Mauritius and the Seychelles, and *C. canaliculatum*, which Dalzell & Gibson cite as a synonym, is *C. pedunculatum*, Br., a native of Eastern Australia.

4. PANCRATIUM, Linn.

Herbs with tunicate bulbs. Leaves linear or lanceolate, often bifarious. Flowers large, umbellate or solitary, sessile or pedicellate, within 1 or 2 membranous spathes; bracteoles few, linear, hyaline. Perianth funnel-shaped; tube usually long, widened at the mouth; lobes 6, narrow, suberect, subequal. Stamens 6, shorter than the perianth, adnate to its throat; filaments filiform, but connate below in a petaloid membranous cup, the edge of which between the free filaments may be toothed or lobed; anthers oblong or shortly linear, dorsifixed. Ovary 3-celled; ovules many, 2-seriate in each cell; style long, filiform; stigma small, capitate. Fruit a large subglobosely 3-angled loculicidally 3-valved capsule. Seeds many, angular; testa thick, lax, black.—DISTRIB. S. Europe, India, Africa; species about 12.

Bulb without a neck; perianth-tube 1½–2 in. long; staminal-cup small ..... 1. *P. triflorum.*
Bulb with a long neck; perianth-tube 3–4 in. long; staminal-cup broad ..... 2. *P. parvum.*

1. **Pancratium triflorum,** *Roxb. Fl. Ind.* v. 2 (1832) p. 126. Bulb globose, 1½–2 in. in diam.; neck 0. Leaves thin, contemporary with the flowers, lanceolate, 8–18 by ½–1 in., linear-lanceolate, acute. Scape slender, 6–9 in. long. Flowers fragrant, 3–8 in an umbel; spathe single, ovate, acute; pedicels very short. Perianth-tube 1½–2 in. long, the throat dilated to ½ in. in diam.; lobes linear, ¾–1 in. long. Staminal-cup ¼ in. long with bifid teeth between the short filaments; anthers ⅙ in. long. Style reaching to the top of the perianth-lobes. Fl. B. I. v. 6, p. 285; Baker, Handb. Amaryllid. p. 118; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522. *Pancratium malabathricum,* Herbert, Amaryllid. (1837) p. 202.—Flowers: May–June.

DECCAN: Mahableshwar, *Woodrow*; Poona, *Woodrow*; Shinvagad, *Symonds*!, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 1449!—DISTRIB. India (Bengal, W. Peninsula).

2. **Pancratium parvum,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 144. Bulb globose; neck long, cylindric. Leaves thin, contemporary with the flowers, 6–9 by ¼–¾ in., linear or linear-lanceolate, attenuated towards the base. Scape very slender, compressed, striate, 6–12 in. long. Flowers white, 2–4 in an umbel; pedicels ½–¾ in. long; spathe single, sometimes deeply bifid. Perianth-tube 3–5 in. long, dilated above; lobes 1 in. long, linear. Staminal-cup funnel-shaped, half as long as the perianth-lobes, 12-toothed; filaments hardly longer than the teeth of the cup, and much shorter than the linear anthers. Ovary many-ovulate; style overtopping the anthers. Capsules ovoid, 3-lobed. Seeds few. Fl. B. I. v. 6, p. 286; Dalz. & Gibs. p. 276; Baker, Handb. Amaryllid. p. 119; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522.—Flowers: June–July.

Stocks without locality in Herb. Kew.! KONKAN: *Kanitkar*!; Konkan hills, *Dalzell & Gibson*; Dronagiri Hill (Thana districts), *Dalzell.* DECCAN: Purandhar, *Woodrow.* S. M. COUNTRY: Belgaum Ghâts, *Ritchie*, 1450! KANARA: *Law*!—DISTRIB. India (W. Peninsula), apparently endemic.

The following plants not belonging to any of the above-named genera are grown as ornamental or useful plants :—

Polianthes tuberosa, Linn. Sp. Pl. (1753) p. 316. *The Tuberose*, much cultivated in gardens in the Presidency and more or less throughout India; a native of Mexico, growing 3–4 ft. high. Leaves radical or on the lower part of the stem. Flowers white, very fragrant, in long terminal simple racemes ; perianth funnel-shaped. Grah. Cat. p. 217 ; Dalz. & Gibs. Suppl. p. 90; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Watt, Dict. Econ. Prodr. v. 6, part 1, p. 312.—VERN. *Gulchabu.*

A number of important fibre-yielding plants belonging to the genera *Agave* and *Furcræa* have been introduced into India, some of which have become naturalized.

The following synopsis of the plants belonging to these genera which are cultivated or naturalized in the Bombay Presidency has been prepared from the paper entitled "Notes on *Agave* and *Furcræa* in India," by Drummond and Prain, of which the authors have been good enough to let me see a copy in advance. The following Key has been prepared for me by Mr. Drummond :—

Stamens in bud inflexed under the tips of the perianth-segments; after æstivation resilient and much longer than the perianth-segments	1. AGAVE.
Stamens about equalling the perianth-segments	2. FURCRÆA.

1. *AGAVE*, Linn.

SECT. I. Euagave. Inflorescence candelabriform.

Perianth-segments narrowed from about the middle to a ligulate tip	1. *A. sisalana*
Perianth-segments not constricted towards the tip.	
Leaves in a close globose rosette	2. *A. Wightii.*
Leaves in a lax rosette or tufted.	
Leaves narrow, linear-oblong	3. *A. Cantala.*
Leaves distinctly broader at or above the middle.	
Neck of leaf sharply constricted	4. *A. americana.*
Neck of leaf hardly constricted	5. *A. Vera-Cruz.*

1. *Agave sisalana*, Perrine, ex Engelmann, in Trans. Acad. Sc. St. Louis, v. 3 (1873) pp. 316–318 ; Drummond & Prain, in Agricultural Ledger, No. 7 (1906) p. 89. Native country unknown ; imported from Central America and the West Indies to India between 1885 and 1892, and grown on a small scale in the Bombay Presidency for its fibre. Mr. Woodrow endeavoured to raise a Company to grow the plant on a large scale in Bombay, but his efforts were unsuccessful. The species varies in India as regards the presence or absence of spines on the leaf-margins. *Agave rigida* var. *sisalana*, Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522.—Flowers : Jan.–Mar.

2. *Agave Wightii*, Drummond & Prain, in Agricultural Ledger, No. 7 (1906) p. 91. Believed to be a native of St. Vincent (W. Indies), widely naturalized and planted for hedges in S. India, where it was probably introduced in the 17th century by the Portuguese or Dutch. *Agave vivipara*, Wight, Icon. t. 2024; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522 (short-leaved form). *Agave Cantula*, Dalz. & Gibs. Bo.

Fl. Suppl. p. 93 (*not* of Roxb.).—Flowers: Jan.-June. VERN. *Chota-Guial.*

KONKAN: Bombay, *Burkhill.* DECCAN: Sattara-road Station (S. M. Railway), *Burkhill.*

A variegated form named *A. Cookei* by Woodrow (Journ. Bomb. Nat. v. 12 (1899) p. 522) is very closely allied to *A. Wightii*, and has been treated as a variety of that plant, though probably a distinct species. Woodrow (*MS.*) describes it as having much white on the margins of the leaves, of slight growth, and very desirable as an ornamental plant in gardens.

3. *Agave Cantala*, Roxb. Hort. Beng. (1814) p. 25; Drummond & Prain, in Agricultural Ledger, No. 7 (1906) p. 87. Native country unknown; naturalized in different parts of India, probably introduced from Central America *viâ* the Philippines in the 17th century. *Agave Cantula*, Roxb. Fl. Ind. v. 2 (1832) p. 167; Grah. Cat. p. 222 (*not* of Dalz. & Gibs.). *A. vivipara*, Dalz. & Gibs. Bo. Fl. (1861) Suppl. p. 93 (*not* of Wight); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522.—Flowers: Jan.-June. VERN. *Guial.*

KONKAN: Bassein, Salsette, Coorla (near Bombay), *Burkhill.* DECCAN: Poona, Sattara, Kolhapur, *Burkhill.* S. M. COUNTRY: Belgaum, *Burkhill.*

4. *Agave americana*, Linn., var. *variegata*, Hook. in Bot. Mag. (1839) t. 3654. Native country unknown; commonly grown as an ornamental plant in parks and large gardens; nowhere naturalized in India. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522.—VERN. *Latia-Guial.*

5. *Agave Vera-Cruz*, Mill. Gard. Dict. ed. 8 (1768) n. 7; Drummond & Prain, in Agricultural Ledger, No. 7 (1906) p. 86. Native country unknown, but most probably Mexico; commonly naturalized and planted as a hedge in S. India and parts of the Deccan; used as a hedge-plant along the S. Maratha Railway line. *Agave Cantula*, Prain, Beng. Pl. p. 1057 (*not* of Roxb.). –

SECT. II. **Littæa.** Inflorescence spicate.

Species belonging to this section may be met with, but in India have been so far grown as ornamental plants exclusively.

2. *FURCRÆA*, Vent.

Only one *Furcræa* has shown any tendency to become naturalized in W. India, which has been usually identified with *Furcræa gigantea*, Vent., but its identity with that species has not as yet been satisfactorily determined by Drummond and Prain, for want of specimens of the inflorescence. It is known as *Mauritius Hemp* or (*fide* Woodrow) *Natal Hemp*. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522.

Planted along the Railway line in the Deccan, *Burkhill.*

ORDER CXXX. TACCACEÆ.

Perennial herbs; rootstock tuberous or creeping. Leaves radical, large, undivided and costate, or pinnately lobed and reticulately veined; petiole long. Flowers hermaphrodite, regular, densely umbellate on the

top of a long naked scape; outer bracts 2–6 (usually 4), leafy and broad, forming an involucre, sometimes colored; inner bracts (bracteoles) under the pedicels many, long, filiform, pendent. Perianth usually lurid, superior, urceolate or subcampanulate, biseriately 6-lobed. Stamens 6, adnate to the perianth-tube or to the base of the perianth-lobes, included; filaments very short, dilated or laterally appendaged at the base, cucullate above the anthers, with 2 ribs or horns on the inner face; anthers 2-celled, sessile within the hood. Ovary inferior, 3-angular, 1-celled; ovules many, on 3 parietal placentas, anatropous or almost amphitropous; style short, included; stigmas 3, often petaloid, broad, 2-fid, and inflexed like an umbrella over the style. Fruit globose, ovoid, turbinate or oblong, 3–6-ribbed, forming an indehiscent berry or rarely a 3-valved capsule. Seeds numerous, ovoid, compressed, longitudinally striate; albumen hard; embryo minute.—DISTRIB. Species about 10, tropical.

1. TACCA, Forst.

Characters of the Order; fruit always indehiscent.

1. **Tacca pinnatifida,** *Forst. Char. Gen.* (1778) p. 70, *t.* 35. Rootstock globose, 6–10 in. in diam.; rootlets superficial. Leaves 1–3 ft. in diam., circular in outline, 3-partite, the segments variously pinnatifid, margins undulate; petioles 1–3 ft. long, terete, striate, hollow. Scape longer than the petiole, tapering upwards, terete, with pale and dark green stripes, 10–40-flowered. Flowers pedicellate, drooping, about $\frac{2}{3}$ in. across, green tinged with purple; involucral bracts 6-12, oblong-lanceolate, acuminate, recurved, striped with purple; bracteoles filiform, numerous, very much longer than the bracts. Perianth subglobose, greenish; lobes margined with purple, connivent. Fruit of the size of a pigeon's egg, yellow, 6-ribbed. Seeds angular. Fl. B. I. v. 6, p. 287; Grah. Cat. p. 230; Dalz. & Gibs. p. 276; Trim. Fl. Ceyl. v. 4, p. 274; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Watt, Dict. Econ. Prod. v. 6, part 3, p. 402.—Flowers: Sept. VERN. *Deva-kanda.*

Dalzell without locality in Herb. Kew. KONKAN: *Nimmo* ex *Graham*, common in the rains, *Dalzell & Gibson*; Worli and Parel Hills (Bombay), *Graham*; Kalyan, *Woodrow.*—DISTRIB. India (Bengal, Central India, W. Peninsula); Ceylon, Malaya, Pacific Islands, Australia.

Tacca lævis, Roxb., which is given in the 'Flora of B. India' as occurring in the S. Konkan, on the authority of Nimmo, ex Grah. Cat. p. 230, has not, in my opinion, any claim to be considered an indigenous plant. Dalzell does not mention it in his 'Bombay Flora,' which was written on Graham's Catalogue as a ground-work. Woodrow merely quotes Graham, and no Bombay botanists seem to have found the plant in that Presidency.

ORDER CXXXI. DIOSCOREACEÆ.

Large, usually climbing herbs with generally a thick fleshy tuberous underground rootstock (rarely a cluster of tuberous roots). Leaves alternate or opposite, simple or compound, costate and reticulate; petioles often angular and twisted at the base. Flowers small, usually 1-sexual, spicate or racemose, dicœcious or monœcious in separate spikes,

regular; bracts small, often minute, sometimes obsolete; male spikes or racemes simple or paniculate; female simple, sometimes reduced to 1–2 flowers; perianth superior, 6-lobed, in 2 series. MALE FLOWERS: Perianth campanulate or rotate, deeply 6-fid, or urceolate with narrow mouth and short spreading lobes. Stamens 6, adnate to the base of the perianth, all perfect or 3 reduced to staminodes, or only 3 and no staminodes; filaments incurved or recurved; anthers small, 2-celled, globose, oblong or didymous, or the cells discrete on branches of the filament. Pistillode various or 0. FEMALE FLOWERS: Perianth usually smaller than in the male, 6-fid or 6-partite, persistent. Staminodes 3 or 6 or 0. Ovary inferior, 3-quetrous, 3-celled; ovules 2 in each cell, superposed, pendulous, anatropous or subamphitropous; styles 3, very short; stigmas entire or 2-fid, recurved. Fruit a berry or 3-valved capsule. Seeds flat or globose; albumen fleshy, rather hard; embryo minute, enclosed in the albumen.—DISTRIB. Genera 8; species about 160, tropical and subtropical.

1. DIOSCOREA, Linn.

Herbs with slender twining (rarely procumbent) stems. Leaves alternate or sometimes opposite, entire or lobed, or digitately 3-9-foliolate. Flowers 1-sexual, usually dicœcious. MALE FLOWERS: Perianth campanulate, rotate, or urceolate; lobes short, spreading. Stamens 6 perfect, or 3 alternating with 3 staminodes, or 3 without staminodes; anthers small, the cells contiguous or discrete. Pistillode thick, fleshy or 0. FEMALE FLOWERS: Perianth-segments 6, free, small. Staminodes 6 or 3 or 0. Ovary inferior, 3-quetrous, 3-celled; ovules 2 in each cell, superposed, laterally attached near the apex; styles 3, short; stigmas terminal, entire or 2-fid, reflexed above the style. Fruit a loculicidal capsule, laterally flattened, almost winged. Seeds compressed, often with a large membranous wing; albumen compressed, fleshy or hard, 2-laminate; embryo between the laminæ with a suborbicular cotyledon.—DISTRIB. Tropical and subtropical; species 150.

Leaves 3–5-foliolate.
- Stamens 6, all antheriferous; leaflets 3 ..... 1. *D. dæmona.*
- Stamens 3 antheriferous, alternating with 3 staminodes; leaflets usually 5, sometimes 3, rarely 7 ..... 2. *D. pentaphylla.*

Leaves simple.
- Capsules longer than broad; seeds winged at the base only; leaves opposite and alternate ..... 3. *D. bulbifera.*
- Capsules suborbicular, often broader than long; seeds winged all round; leaves usually opposite ..... 4. *D. oppositifolia.*

1. **Dioscorea dæmona,** *Roxb. Fl. Ind.* v. 3 (1832) p. 805. Root tuberous, lobed, biennial; stems twining, more or less prickly. Leaves 3-foliolate; common petiole 4–8 in. long, usually prickly; leaflets 4–8 by 2–5 in., all petiolulate, broadly cuneate-obovate, cuspidately caudate-acuminate, villous when young, glabrous in age, sometimes reticulately veined, base tapering, 3–5-nerved; lateral leaflets very oblique; petiolules $\frac{1}{8}$–$\frac{5}{8}$ in. long. MALE FLOWERS in dense cylindric pedunculate spikes $\frac{1}{4}$–$\frac{1}{3}$ in. long, arranged in clusters along the more or less prickly, pubescent or villous rhachis of a raceme 6–18 in. long; peduncles of spikes $\frac{1}{20}$–$\frac{1}{4}$ in. long, pubescent; bracts broadly ovate, deltoid at the apex, pubescent, shorter than the flowers. Perianth

nearly $\frac{1}{8}$ in. across; lobes broadly oblong or suborbicular, usually rounded, the 3 outer membranous, shorter than the inner, the 3 inner coriaceous or somewhat fleshy, with incurved tips, longer than the outer. Stamens 6, all antheriferous; anthers subsessile. Pistillode very low, broad. FEMALE FLOWERS: Spikes solitary, distant. Capsules 2 by 1 in., quadrately oblong, truncately rounded at the ends, smooth and polished; pedicels very short. Seeds $1\frac{1}{4}$ in. long (including the wing); wing $\frac{7}{8}$ by $\frac{1}{2}$ in., at the base of the seed, membranous, oblong, obtuse, broader than the flat oblique nucleus. Fl. B. I. v. 6, p. 289; Wight, Icon. t. 811; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Prain, Beng. Pl. p. 1064; Watt, Dict. Econ. Prod. v. 3, p. 129. *Helmia dæmona*, Kunth, Enum. v. 5 (1850) p. 439; Dalz. & Gibs. p. 247.—Flowers: Oct.

Not common in the Bombay Presidency. KONKAN: *Law*!; hills in the Konkan rare, *Dalzell & Gibson*; Vingorla, *Dalzell & Gibson*. S. M. COUNTRY: Castlerock, *Woodrow*. KANARA: below the fall on the Kála naddi, *Ritchie*, 1448!—DISTRIB. Throughout India; Malaya, Tonkin.

2. **Dioscorea pentaphylla,** *Linn. Sp. Pl.* (1753) p. 1032. Root-tubers oblong, very long (5–6 ft. according to Thwaites); stem slender, twining, glabrous, prickly towards the base, often bulbiferous in the leaf-axils. Leaves alternate, 3–5 (rarely 7) -foliolate, glabrous or sparsely pubescent beneath; common petiole 1–$2\frac{1}{2}$ in. long; leaflets variable in size and shape, 2–5 by 1–2 in., elliptic-lanceolate, ovate or obovate, acuminate, cuspidate or subcaudate, base usually acute; lateral leaflets oblique at the base; petiolules very short. MALE FLOWERS pale-greenish, fragrant, in very slender shortly pedunculate racemes 1–$1\frac{1}{2}$ in. long, which are solitary or in fascicles along the hairy branches of a panicle 6–12 in. long; bracts $\frac{1}{10}$ in. long and as broad as long, membranous, often mottled with brown, broadly ovate or almost semicircular, with a long slender acumen, glabrous. Perianth nearly $\frac{1}{8}$ in. across when spread out; segments often mottled with brown, ovate, subacute, sparsely pubescent, subequal; pedicels very short. Stamens 3 perfect; anthers subsessile; staminodes 3, minute. Pistillode 3-lobed. FEMALE FLOWERS in axillary pendulous pubescent spikes 2–6 in. long. Capsules quadrately oblong, $\frac{3}{4}$–1 in. long, usually retuse at both ends, nearly glabrous or more or less pubescent, often apiculate. Seeds $\frac{1}{2}$–$\frac{3}{4}$ in. long (including the wing at the base); wing longer and broader than the oblique nucleus, thinly membranous. Fl. B. I. v. 6, p. 289; Grah. Cat. p. 218; Dalz. & Gibs. p. 247; Wight, Icon. t. 814; Trim. Fl. Ceyl. v. 4, p. 276; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522; Prain, Beng. Pl. p. 1065; Watt, Dict. Econ. Prod. v. 3, p. 132. *Dioscorea triphylla*, Linn. Sp. Pl. (1753) p. 1032; Grah. Cat. p. 218; Dalz. & Gibs. p. 247. *D. Jacquemontii*, Hook. f. Fl. B. I. v. 6 (1892) p. 290.—Flowers: Sept.–Oct. VERN. *Shendvel.*

KONKAN: *Dalzell & Gibson*; Konkan and Ghâts, *Graham*. DECCAN: Khandala, *Cooke*!; Sinhagad, *Woodrow*; Mahableshwar, *Cooke*!, *H. M. Birdwood*; between Poona and Karli, *Jacquemont*! S. M. COUNTRY: Belgaum, *Ritchie*, 730!—DISTRIB. Throughout India; Ceylon, Malay hills, Tropical Africa. The tubers of the wild plant are dug up and eaten throughout India. The fragrant male flowers are sold in the native bazaars and eaten as greens (*Dalzell & Gibson*).

I cannot separate *Dioscorea Jacquemontii*, Hook. f., from *D. pentaphylla*, which is itself a rather variable plant. I have found mottled bracts and mottled perianth-lobes, as well as flowers nearly $\frac{1}{8}$ in. across when spread out, in many specimens of *D. pentaphylla* from several localities in the Presidency. The difference in the size of

the flowers, varying perhaps $\frac{1}{8}$–$\frac{1}{6}$ in. or so, may, I think, depend not only on the age of the plant, but also (as is the case with the leaves) on the part of the plant from which they have been gathered. In Herb. Kew. I have found that a specimen collected by *Ritchie* in Belgaum (No. 730) has been named *D. Jacquemontii*, while a similar specimen, collected in the same locality and bearing the same number, has been consigned to the *pentaphylla* bundle.

3. **Dioscorea bulbifera,** *Linn. Sp. Pl.* (1753) p. 1033. Tubers large, globose or elongate; stem terete, unarmed, glabrous, bulbiferous in the leaf-axils, the bulbils warted. Leaves opposite and alternate, variable in size, 3–14 in. long and broad, membranous, dark-green, broadly ovate, acuminate, cuspidate or caudate, base cordate with a broad, deep, or shallow sinus; nerves 7–9 (rarely 11). MALE FLOWERS variable in size, green or purplish, in short slender (almost capillary) spikes 1–4 in. long, close together or scattered on the branches of crowded axillary slender pendulous glabrous spikes or panicles reaching 12 in. long; bracts ovate, acuminate. Perianth sessile by a broad base; segments subvalvate, fleshy, the outer $\frac{1}{10}$ in. long, lanceolate, the inner smaller and narrower. Stamens 6; filaments short; anthers minute, didymous; pistillode 3-lobed. FEMALE FLOWERS sessile, $\frac{1}{5}$ in. long, in axillary solitary or fascicled pendulous spikes 4–10 in. long. Perianth as in the male. Staminodes 6. Bracts below the ovary minute, ovate, acuminate. Style short, conical; stigmas 3, very short, recurved. Capsules $\frac{2}{3}$–1 in. by $\frac{1}{3}$–$\frac{1}{2}$ in., quadrately oblong, rather broader upwards, with a truncate or subcordate base. Seeds winged at the lower end only, the wing twice as long as the nucleus. Grah. Cat. p. 219; Trim. Fl. Ceyl. v. 4, p. 279 *in adnot.*; Wight, Icon. t. 878: Watt, Dict. Econ. Prod. v. 3, p. 128. *Dioscorea bulbifera* var. *pulchella*, Prain, Beng. Pl. p. 1065. *D. pulchella* (sp.), Roxb. Fl. Ind. v. 3 (1832) p. 801. *Helmia bulbifera*, Kunth, Enum. v. 5 (1850) p. 435; Dalz. & Gibs. p. 247.—Flowers: Aug.–Oct. VERN. *Kadu-karanda.*

Stocks without locality in Herb. Kew.! KONKAN: *Graham, Dalzell & Gibson*; Dapoli, *Nairne*. S. M. COUNTRY: Belgaum, *Ritchie*, 728!; Londa, *Cooke*!—DISTRIB. Throughout India; Ceylon.

VAR. *sativa*, Prain, Beng. Pl. p. 1065. Stem with axillary bulbils, smooth, not warted. *Dioscorea sativa* (sp.), Hook. f. Fl. B. I. v. 6 (1892) p. 295; Grah. Cat. p. 218; Dalz. & Gibs. Suppl. p. 92; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Watt, Dict. Econ. Prod. v. 3, p. 133.—VERN. *Gorkan.*

Occasionally cultivated.

4. **Dioscorea oppositifolia,** *Linn. Sp. Pl.* (1753) p. 1033. A large climber; rootstock short, with many long cylindric roots as thick as a swan's quill; stem slender, unarmed; branches terete, not bulbiferous, glabrous or pubescent. Leaves coriaceous, opposite or subopposite (rarely alternate), simple, 2–5 by 1–3 in., polymorphous, from lanceolate to elliptic-oblong, ovate or suborbicular, acuminate or rounded, with well-defined cartilaginous margins, usually glabrous, base rounded, with 3–5 strong nerves; petioles $\frac{1}{4}$–$1\frac{1}{4}$ in. long. MALE FLOWERS in dense shortly pedunculate spikes $\frac{3}{8}$–$1\frac{1}{4}$ in. long which are fascicled in the leaf-axils or along a slender axillary rhachis 4–10 in. long; bracts below the spikes $\frac{1}{8}$ in. long, lanceolate-subulate; bracts below the flowers $\frac{1}{20}$ in. long, ovate, acuminate, membranous, mottled with brown. Perianth

sessile with a broad base; outer lobes $\frac{1}{12}$ by $\frac{1}{16}$ in., broadly ovate or suborbicular, concave, obtuse, mottled with brown; inner lobes smaller, somewhat ovate, mottled with brown. Stamens 6, perfect; anthers didymous; pistillode obscure. FEMALE FLOWERS distant, in solitary or fasciculate axillary spikes 6–8 in. long; bracts $\frac{1}{20}$ in. long, suborbicular, acuminate, and as well as the perianth-lobes mottled with brown. Capsules suborbicular or often broader than long, 1–1½ in. in diam., truncate, retuse or almost 2-lobed at the apex, coriaceous, glabrous, base cuneate. Seeds orbicular, ¾–1 in. in diam. with a large membranous wing all round the nucleus. Fl. B. I. v. 6, p. 292; Grah. Cat. p. 219; Dalz. & Gibs. p. 247; Wight, Icon. t. 813; Trim. Fl. Ceyl. v. 4, p. 276; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Watt, Dict. Econ. Prod. v. 3, p. 132.—Flowers: Sept.–Oct. VERN. *Paspoli.*

Stocks without locality in Herb. Kew.! KONKAN: *Stocks*! DECCAN: near Poona, *Woodrow*, 364!; Bowdhan, 8 miles W. of Poona, *Kanitkar*!; Khandala, *Cooke*!; near Shivapur, *Kanitkar*! KANARA: *Stocks*!—DISTRIB. East and west coasts of S. India, Assam; Ceylon.

Dioscorea fasciculata, Roxb. Fl. Ind. v. 3 (1832) p. 801. Var. *spinosa*, Prain, Beng. Pl. p. 1065. Tubers few, unequal, mixed with many fibrous roots, of which the uppermost are spinous. Leaves pubescent, reniform or orbicular, cordate at the base, with sharp stipule-like spines. Capsules broader than long, broadly obcordate. *Dioscorea spinosa* (sp.), Roxb. ex Wall. Cat. (1828) 5103; Hook. f. in Fl. B. I. v. 6 (1892) p. 291; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 522. *D. aculeata*, Roxb. Fl. Ind. v. 3 (1832) p. 800; Grah. Cat. p. 218; Dalz. & Gibs. Suppl. p. 92; Watt, Dict. Econ. Prod. v. 3, p. 125.

Sparingly cultivated in gardens. The tubers are largely imported into Bombay and known as the *Goa Potato* (*Graham, Dalzell & Gibson*).

Dioscorea alata, Linn. Sp. Pl. (1753) p. 1033. Var. *globosa*, Prain, Beng. Pl. p. 1065. Quite glabrous; tubers roundish or oblong, white inside; stem acutely angled or winged. Leaves mostly opposite, 3–7 by 1½–5 in., broadly ovate, cuspidately acuminate, subhastately or deeply cordate and 7–9-nerved at the base; petioles 2–5 in. long. Capsules 1 by 1½ in., broader than long, of 2 semicircular flat lobes, retuse at the apex, cuneate at the base. Seeds with a wing all round. Cultivated commonly. *Dioscorea alata* (sp.), Grah. Cat. p. 218; Hook. f. Fl. B. I. v. 6, p. 296; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523 (all in part). *Dioscorea globosa* (sp.), Roxb. Fl. Ind. v. 3 (1832) p. 797; Dalz. & Gibs. Suppl. p. 92; Watt, Dict. Econ. Prod. v. 3, p. 131. Graham says that the plant is wild in the Konkan, but this is not the case. The plant has not apparently been found wild in India and is only known in cultivation. The tubers are much esteemed as a vegetable by Europeans and natives.—Flowers: Aug. VERN. *Goradu.*

EXCLUDED SPECIES.

DIOSCOREA GLABRA, Roxb. Fl. Ind. v. 3 (1832) p. 804. This species does not appear to occur in the Bombay Presidency, though the Konkan is assigned as its habitat in the 'Flora of British India.' There are no specimens from the Konkan in Herb. Kew. Woodrow in his list merely copies the Flora of B. I., but neither he nor any other botanist has discovered the plant in Bombay.

Order CXXXII. LILIACEÆ.

Herbs (very rarely shrubs or small trees) with fibrous roots, or a creeping rootstock, or a bulb or corm. Leaves various. Flowers usually hermaphrodite, axillary or terminal, solitary, or twin, or umbellate, spicate, racemose, paniculate, or fasciculate; bracts usually small, scarious, sometimes, when the flowers are umbellate, spathe-like. Perianth herbaceous or petaloid, usually 6-merous in 2 series, imbricate (rarely valvate) in bud. Stamens 6 (rarely 3 or fewer), hypogynous or adnate to the perianth; filaments free or connate; anthers oblong or linear, often dorsifixed, usually dehiscing longitudinally. Ovary 3-celled; ovules 2 or more from the inner angles of the cells, anatropous (rarely orthotropous); style usually simple, often long (rarely short or 0), or styles 3. Fruit a capsule or berry, usually 3 (rarely 1)-celled. Seeds 1 or more, globose or flattened; albumen horny or fleshy; embryo small, terete.—Distrib. Genera 187; species about 2500, in all climates and countries.

Shrubs with perennial stems above ground; fruit berry-like.
- Stems climbing or straggling; leaves replaced by linear or acicular cladodes ..... 1. Asparagus.
- Stems leafy.
  - Leaves 3–5-nerved and reticulately veined, arranged at intervals along a usually climbing stem ..... 2. Smilax.
  - Leaves closely and numerously parallel-nerved, generally clustered at the apex of a usually erect caudex ..... 3. Dracæna.

Herbs with annual stems or scapes rising usually from underground perennial rootstocks, corms, or bulbs, rarely (*Asphodelus*) the plant wholly annual.
- Underground perennial stems large in proportion to the roots.
  - Perennial stem a creeping rootstock; annual aerial stem erect, leafy; leaves broad; fruit a berry ..... 4. Disporum.
  - Perennial stem compact, not creeping; fruit a loculicidal capsule.
    - Aerial annual stem climbing, leafy; leaves broad, with tendril-like tips; perianth large, showy; rootstock tuber-like, irregular, naked ..... 5. Gloriosa.
    - Aerial annual stems or scapes erect; leaves narrow; rootstock a globose coated corm or bulb.
      - Perennial stem a solid corm covered with brown sheaths; annual stem leafy; flowers solitary or corymbose ..... 6. Iphigenia.
      - Perennial stem a tunicated bulb; annual scape simple, naked; leaves radical; flowers racemose.
        - Seeds subglobose; perianth 6-partite; segments stellate ..... 7. Scilla.
        - Seeds flattened.
          - Perianth campanulate, 6-partite ..... 8. Urginea.
          - Perianth cylindric, 6-lobed; outer lobes recurved from the middle, the inner from the tips only ..... 9. Dipcadi.
- Underground perennial stem small or (*Asphodelus* sometimes) none; root-fibres large, numerous, usually some or all fleshy or tuberous; leaves radical; capsule loculicidal.
  - Each cell of the ovary 2-ovulate; capsule 3-quetrous; leaves semiterete; plant often wholly annual ..... 10. Asphodelus.
  - Each cell of the ovary 4- or more-ovulate; capsule deeply 3-winged; leaves flat ..... 11. Chlorophytum.

1. ASPARAGUS, Linn.

Undershrubs; stems erect, straggling or climbing, terete, grooved or angled; rootstock stout, creeping. Leaves minute, scale-like, bearing in their axils tufts of needle-like or flattened cladodes. Flowers hermaphrodite (in the Bombay species), small or minute, axillary, solitary, fasciculate or racemose, pendulous; pedicels jointed; bracts minute or obsolete. Perianth petaloid, 6-partite, campanulate or funnel-shaped. Stamens 6, adnate to the base of the perianth-segments; filaments free; anthers oblong. Ovary 3-celled; ovules 2 or more in each cell; style columnar; stigmas 3, recurved. Fruit a globose pulpy berry. Seeds few or by abortion solitary, subglobose; testa black, fragile; embryo dorsal; albumen hard.—DISTRIB. Europe and Temperate and Tropical Asia and Africa; species about 100.

Flowers in axillary clusters, not racemose.
- An erect straggling undershrub; leaves with small spinous spurs $\frac{1}{20}$ in. long; cladodes mucronate, in clusters of 3–8, straight or falcate ..... 1. *A. dumosus.*
- A subscandent undershrub; leaves with hard conical spinous spurs $\frac{1}{8}$–$\frac{1}{4}$ in. long; cladodes 3-gonous, acuminate, in clusters of 3–5 ..... 2. *A. Jacquemonti.*

Flowers racemose.
- Cladodes subulate or 3-quetrous.
  - Cladodes short, less than $\frac{1}{2}$ in. long; bracts large ..... 3. *A. lævissimus.*
  - Cladodes more than $\frac{1}{2}$ in. long, very slender; bracts small ..... 4. *A. racemosus* var. *javanica.*
- Cladodes flattened, linear, $\frac{1}{20}$–$\frac{1}{16}$ in. wide, usually falcate ... 5. *A. gonoclados.*

1. **Asparagus dumosus,** *Baker, in Journ. Linn. Soc.* v. 14 (1874) p. 608. A branched spreading diffuse undershrub, 2 ft. high, the older branches woody, the younger flexuous; branchlets pale, glabrous, conspicuously striate, the striæ often minutely scabrous. Leaves deltoid-ovate, cuspidate, with a spur about $\frac{1}{20}$ in. long at the base, standing out from the branch. Cladodes $\frac{1}{4}$–$\frac{1}{2}$ in. long, in clusters of 3–8, stout, linear, channelled, mucronate. Flowers axillary, 2–4-nate; pedicels $\frac{1}{10}$ in. long, filiform. Perianth rather more than $\frac{1}{8}$ in. long, funnel-shaped; segments oblanceolate. Stamens $\frac{1}{16}$ in. long; anthers subglobose, $\frac{1}{30}$ in. in diam. Style $\frac{1}{20}$ in. long; stigmas 3, spreading, about $\frac{1}{30}$ in. long. Berry $\frac{1}{6}$ in. in diam. Fl. B. I. v. 6, p. 315; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523.

SIND: *Stocks*, 441!; *Dalzell*, 59!; Jemadar ka Landa near Karachi, *Stocks*, 441! Apparently endemic in Sind.

2. **Asparagus Jacquemonti,** *Baker, in Journ. Linn. Soc.* v. 14 (1874) p. 615. A branched subscandent undershrub; stems terete, quite smooth, with angular flexuous spreading or decurved branchlets. Leaves spurred at the base with hard spines $\frac{1}{8}$–$\frac{1}{4}$ in. long. Cladodes 3–5-nate, spreading, arcuate, 3-quetrous, $\frac{3}{8}$–$\frac{1}{2}$ in. long. Flowers axillary, solitary or in pairs, sometimes furnished with a short common peduncle; pedicels $\frac{1}{8}$–$\frac{1}{6}$ in. long, filiform, jointed above the middle. Perianth $\frac{1}{16}$–$\frac{1}{10}$ in. long; segments oblong-obovate, obtuse, spreading. Anthers about $\frac{1}{60}$ in. in diam., globose. Style short. Berry not seen. Fl. B. I. v. 6, p. 316; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523.

DECCAN: between Poona and Karli, *Jacquemont*, 526!

There is but 1 sheet in Herb. Kew. without fruit. The plant does not appear to have been found by any other collector, which, considering that the locality indicated by Jacquemont is on the Railway line, seems strange.—Distrib. India (W. Peninsula).

3. **Asparagus lævissimus,** *Steud. in Hohen. Pl. Nilg. Exsicc.* no. 1304. A subscandent undershrub; main stems terete, polished; branches conspicuously striate; branchlets ascending, angular. Leaves with stout conical deflexed rigid spinous spurs, $\frac{1}{3}$–$\frac{1}{2}$ in. long at the base. Cladodes 3–6-nate, spreading or ascending, 3-quetrous, $\frac{1}{4}$–$\frac{3}{8}$ by $\frac{1}{30}$ in. Flowers in dense racemes 1–2 in. long, solitary or twin; pedicels $\frac{1}{10}$–$\frac{1}{8}$ in. long, filiform, jointed at or below the middle; bracts below the pedicels $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate, acute, concave. Perianth-segments $\frac{1}{10}$–$\frac{1}{8}$ by $\frac{1}{30}$ in., linear-oblong, obtuse. Stamens as long as the perianth; anthers $\frac{1}{50}$ in. in diam., subglobose. Style very short and stout; stigmas 3, spreading. Berry $\frac{1}{4}$ in. in diam. Fl. B. I. v. 6, p. 317; Baker, in Journ. Linn. Soc. v. 14 (1874) p. 623; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523.

Rare. Konkan: *Stocks*!, *Law*!; Western Ghâts, *Woodrow*.—Distrib. India (W. Peninsula).

4. **Asparagus racemosus,** *Willd. Sp. Pl.* v. 2 (1799) p. 152. Var. **javanica,** *Baker, in Journ. Linn. Soc.* v. 14 (1874) p. 624. An extensively scandent spinous much-branched undershrub; rootstock tuberous; branches angular. Leaves $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear-subulate, with a stout conical spinous spur, straight or slightly curved, $\frac{1}{6}$–$\frac{1}{8}$ in. long, at the base. Cladodes very slender, $\frac{1}{2}$–1 in. long, spinous-pointed. Flowers white, fragrant, in simple (rarely branched) racemes 2–6 in. long; rhachis 3-quetrous, with several cladodes along it, increasing in number towards the apex, which is often crowned with a tuft of them; pedicels $\frac{1}{8}$–$\frac{1}{5}$ in. long, filiform, jointed above the middle, usually solitary, but sometimes 2-nate along the rhachis, with a small ovate acute bract $\frac{1}{16}$ in. long at the base. Perianth-segments $\frac{1}{10}$ by $\frac{1}{30}$ in., linear-oblong, obtuse. Anthers subglobose, $\frac{1}{50}$ in. in diam. Style very short; stigmas spreading. Berry globose, $\frac{1}{6}$ in. in diam., red when ripe. Fl. B. I. v. 6, p. 316; Wight, Icon. t. 2056; Baker, in Journ. Linn. Soc. v. 14 (1874) p. 623; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1070; Watt, Dict. Econ. Prod. v. 1, p. 345. *Asparagus sarmentosus*, Grah. Cat. p. 221 (*not* of Linn.). *Asparagopsis javanica*, Kunth, Enum. (1850) v. 5, p. 100. *Asparagopsis sarmentosa*, Dalz. & Gibs. Bo. Fl. (1861) p. 246 (*not* of Kunth).—Flowers: June–Sept. Vern. *Satavari.*

Common on the Ghâts. Konkan: *Law*!, *Stocks*!, *Graham*. Deccan: *Graham*; common on Deccan hills, *Cooke*!, *Woodrow*!; Panchgani, *Cooke*!; Mahableshwar, *Cooke*!, *H. M. Birdwood*. S. M. Country: Castlerock, *Woodrow*; Badami, *Woodrow*! Gujarat: *Dalzell & Gibson*. Kanara: Kála naddi, *Ritchie*, 737!—Distrib. India (W. Peninsula); Java.

The oblong fleshy tubers are often candied for the table.

5. **Asparagus gonoclados,** *Baker, in Journ. Linn. Soc.* v. 14 (1874) p. 627. A much-branched subscandent armed undershrub; main stems smooth, terete; branches firm, green, 3-quetrous. Leaves spurred at the base with hard spines $\frac{1}{4}$–$\frac{1}{2}$ in. long. Cladodes 2–6-nate, $\frac{3}{4}$–1 by $\frac{1}{20}$–$\frac{1}{16}$ in., flat, usually falcate, ascending, firm, subcostate, narrowed to both ends, finely spinous-pointed. Flowers white, in racemes 1–3 in.

long, sometimes fasciculate or obscurely paniculate; pedicels $\frac{1}{20}$–$\frac{1}{12}$ in. long, jointed about the middle; bracts $\frac{1}{10}$ in. long, ovate, boat-shaped. Perianth $\frac{1}{16}$–$\frac{1}{12}$ in. long; segments spreading, the outer linear-oblong, the inner subspathulate. Anthers minute. Berry globose, $\frac{1}{6}$ in. in diam., or didymous and twice as broad (*Trimen*). Fl. B. I. v. 6, p. 318; Trim. Fl. Ceyl. v. 4, p. 286; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523.—Flowers: Jan.

Rare. KONKAN: *Law*! KANARA: Siddapur (N. Kanara), *Woodrow*.—DISTRIB. India (W. Peninsula); Ceylon.

Asparagus officinalis, Linn. Sp. Pl. (1753) p. 313. *The Asparagus*, often cultivated in the gardens of Europeans in India, but requiring very careful treatment and high manuring to produce shoots of any size. As asparagus plantations in India do not last long, it is advisable to prepare a fresh one yearly.

2. **SMILAX,** Linn.

Climbing shrubs (rarely erect herbs). Leaves alternate (rarely opposite), persistent, 3–7-nerved, reticulately veined; petiole usually with 2 tendrils above its base. Flowers small, umbellate, dicœcious. Perianth of 6 free, usually incurved or recurved, subequal segments. MALE FLOWERS: Stamens 6 or more, inserted at the base of the perianth; filaments erect, free, long or short; anthers oblong, 2-celled, didymous, with contiguous cells or with cells discrete by a forking of the connective. Pistillode 0. FEMALE FLOWERS: Staminodes 3 or 6, filiform. Ovary 3-celled, 3-gonous; ovules 1–2 in each cell, orthotropous, pendulous; style short or 0; stigmas 3, stout, recurved. Fruit a globose berry. Seeds solitary, or more often 2, hemispheric (rarely 3); albumen horny: embryo small.—DISTRIB. Species about 180, in temperate and tropical regions.

1. **Smilax macrophylla,** *Roxb. Hort. Beng.* (1814) p. 72. A large climber; stems smooth, striate, armed with a few small distant prickles or almost unarmed. Leaves alternate, 3–8 by $1\frac{1}{2}$–$4\frac{1}{2}$ in. (much larger in some Kumaon and Rangoon specimens), broadly ovate, or suborbicular, acuminate or cuspidate, glabrous, polished and shining, base usually rounded; main nerves 5–7 (usually 5), with reticulate venation between; petioles $\frac{1}{2}$–1 in. long, stout, narrowly sheathing below the middle; tendrils very long and slender. Flowers in pedunculate many-flowered umbels; peduncles $\frac{1}{2}$–$\frac{3}{4}$ in. long; bracts below the peduncles ovate, acute, $\frac{1}{10}$–$\frac{1}{6}$ in. long; pedicels of both male and female flowers arising from an aggregation of numerous minute bracts. MALE FLOWERS: Pedicels $\frac{1}{8}$ in. long. Perianth $\frac{1}{4}$–$\frac{1}{3}$ in. long; segments linear, obtuse, erect when young, afterwards reflexed, the 3 outer $\frac{1}{10}$ in. broad, the 3 inner half as broad. Stamens $\frac{1}{4}$ in. long. FEMALE FLOWERS: Perianth rather shorter than in the male, the segments reflexed, the 3 outer ovate-oblong, obtuse, $\frac{1}{12}$ in. broad, the 3 inner half as broad; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long, slightly elongating in fruit. Stigmas 3, recurved. Berry perfectly spherical, of the size of a large pea, smooth, remaining green for a long time, becoming ultimately red when ripe; fruiting pedicels $\frac{5}{8}$–1 in. long. Fl. B. I. v. 6, p. 310; Grah. Cat. p. 219; Dalz. & Gibs.

p. 246; DC. Monog. Phan. v. 1 (1878) p. 193; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1071; Watt, Dict. Econ. Prod. v. 6, part 3, p. 255. *Smilax ovalifolia*, Roxb. Fl. Ind. v. 3 (1832) p. 794; Grah. Cat. p. 219; Dalz. & Gibs. p. 246.—Flowers: Aug. VERN. *Ghotvel.*

KONKAN: *Graham, Dalzell & Gibson.* DECCAN: Mahableshwar, common, *Cooke!*, *H. M. Birdwood, Woodrow.* S. M. COUNTRY: Chorla Ghát, *Dalzell & Gibson.*—DISTRIB. Throughout India.

3. **DRACÆNA,** Linn.

Shrubs (sometimes climbing) or small trees. Leaves alternate or crowded and subterminal, sessile or petiolate, many-nerved, costate or not. Flowers in terminal racemes, panicles, heads, or umbels; bracts small. Perianth corolline, tubular, campanulate or funnel-shaped, 6-cleft; lobes narrow. Stamens 6, adnate to the base of the perianth-tube; filaments filiform or flattened; anthers versatile. Ovary 3-celled; ovules in each cell solitary, erect; style filiform; stigma capitate. Fruit a globose, didymous or 3-lobed berry. Seeds globose or angled; testa thickened; albumen horny; embryo small.—DISTRIB. Warm regions of the Old World; species about 35.

1. **Dracæna terniflora,** *Roxb. Fl. Ind.* v. 2 (1832) p. 159. A slightly branched glabrous straggling shrub, the stems scarcely more than $\frac{1}{4}$ in. thick, sometimes rooting at the base. Leaves (including the petioles) 8–12 by $1\frac{3}{4}$–$2\frac{1}{2}$ in., somewhat crowded, elliptic-lanceolate, acute or acuminate, thinly coriaceous, narrowed into the petiole; petioles 1–3 in. long, with a widened subamplexicaul base. Flowers white, often 2–3 together on the rhachis of a usually simple raceme 4–8 in. long; pedicels $\frac{1}{6}$ in. long, jointed in the middle; bracts scarious, ovate, acute. Perianth $\frac{3}{4}$–$\frac{7}{8}$ in. long, divided to about the middle; lobes linear, obtuse, $\frac{1}{12}$ in. broad. Anthers $\frac{1}{10}$ in. long. Style $\frac{5}{8}$ in. long. Fruit a red globose berry nearly as large as a cherry, smooth, glossy, 1-seeded. Fl. B. I. v. 6, p. 328; Kurz, For. Fl. v. 2, p. 545 (by error *ternifolia*); Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1072. *D. spicata*, Baker, in Journ. Linn. Soc. v. 14 (1874) p. 532. *D. terminalis*, Wight, Icon. v. 6 (1853) p. 26, t. 2054. *D. Heyneana*, Wall. Cat. (1828) 5151.—Flowers: Dec.

Ritchie without locality, 1461, in Herb. Kew.! KONKAN: Wari country, *Dalzell!* S. M. COUNTRY: Castlerock, *Cooke!* KANARA: Kumpta-Sirsi Road, *Woodrow!*—DISTRIB. More or less throughout India; Malay Peninsula.

Mr. Baker (Journ. Linn. Soc. l. c.) unites this with *D. spicata*, Roxb., under that specific name. Prain (Beng. Pl. p. 1072) gives characters by which the two species may be distinguished. *D. spicata* is a small tree with erect stems, broadly and shortly petiolate leaves, flowers in fascicles, and an orange-red berry, while *D. terniflora* is a straggling shrub with ascending weakly branched stems, narrowly and distinctly petiolate leaves, flowers 2–3-nate, and a cherry-red berry.

The following are often grown in gardens:—

Dracæna elliptica, Thunb. Diss. Bot. Dracæn. (1808) p. 6. An undershrub, a native of Silhet, the Khasia Hills, Birma, the Andamans, and Java, $2\frac{1}{2}$ ft. high, with terete stems as thick as a goose-quill, leaves green, or blotched with white or black, or all purple, and with greenish-yellow

flowers in pedicellate fascicles of threes. Fl. B. I. v. 6, p. 330; Woodr. Gard. in Ind. ed. 5, p. 506.

There is a pretty variety, *maculata* (Bot. Mag. t. 4787), with the leaves spotted or blotched with yellow.

Dracæna concinna, Kunth, Enum. v. 5 (1850) p. 8. A neat-growing species reaching 6 ft. high, with narrow green leaves with purplish-red margins, a native of Mauritius. Woodr. Gard. in. Ind. ed. 5, p. 505.

Dracæna Goldieana, Bull, Cat. (1877) p. 9. A magnificent ornamental foliage plant of erect habit, a native of Tropical Africa. It bears white flowers in a dense globose sessile head 2 in. in diam., and ovate cordate acuminate leaves, marbled and irregularly banded with dark green and silvery grey in alternate straight or furcate bands. Woodr. Gard. in Ind. ed. 5, p. 507; Illust. Hortic. v. 25 (1878) p. 8, t. 300.

4. **DISPORUM,** Salisb.

Herbs with erect angular leafy stems arising from a creeping root-stock. Leaves sessile or subsessile, strongly nerved. Flowers in terminal or axillary few-flowered umbels; pedicels decurved. Perianth narrowly campanulate, deciduous; lobes 6, petaloid, subequal, free, erect or spreading at the tips, their bases saccate or spurred. Stamens 6, hypogynous; anthers dorsifixed, dehiscing extrorsely. Ovary 3-celled; ovules 2–6 in each cell; style long or short; stigmas 3, short. Fruit a fleshy pisiform black berry. Seeds few, subglobose; testa brown; albumen horny; embryo small.—DISTRIB. Species about 12, Asiatic and N. American.

1. **Disporum Leschenaultianum,** *D. Don, in Trans. Linn. Soc.* v. 18 (1839) p. 518. Stem 1–2 ft. high, acutely angular, simple below and clothed with broad sheathing scales, dichotomously branched above. Leaves 1–4 by 1–2 in., ovate-oblong, cuspidately acuminate, membranous, green on both sides, with 5–9 strong nerves and many slender intermediate ones, base rounded; petioles $\frac{1}{8}$–$\frac{1}{4}$ in. long. Flowers white, in axillary 3–5-flowered sessile umbels; pedicels $\frac{5}{8}$–$\frac{7}{8}$ in. long. Perianth $\frac{3}{8}$–$\frac{5}{8}$ in. long; segments $\frac{1}{8}$–$\frac{1}{4}$ in. broad, oblong-lanceolate, subacute, obscurely ciliolate on the margins and with a subsaccate base. Filaments stout, about as long as the anthers. Berry $\frac{3}{4}$ in. in diam., depressed-globose, dark-blue when ripe. Seeds globose. Fl. B. I. v. 6, p. 360; Wight, Icon. t. 2048; Baker, in Journ. Linn. Soc. v. 14 (1874) p. 590; Trim. Fl. Ceyl. v. 4, p. 289; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524. *Disporum mysorense*, Wight, Icon. v. 6 (1853) p. 25, t. 2049. *D. ceylanicum*, Wight, Icon. v. 6 (1853) p. 26, t. 2049.

Rare. KANARA: Santaveri (N. Kanara), *Talbot* ex *Woodrow*.—DISTRIB. India (W. Peninsula); Ceylon.

5. **GLORIOSA,** Linn.

Climbing herbs; stems leafy, springing from a naked tuberous root-stock. Leaves alternate, opposite or 3-nately whorled, lanceolate, strongly nerved, with a long spiral tendril-like apex. Flowers large, showy, axillary, solitary; pedicels reflexed at the tip. Perianth petaloid, persistent; segments 6, subequal, spreading or reflexed, the margins

often undulate. Stamens 6, hypogynous; filaments filiform; anthers linear, dorsifixed, versatile, dehiscing extrorsely. Ovary 3-celled; ovules numerous in each cell; style filiform, deflexed, with 3 subulate arms, stigmatose within. Fruit a large coriaceous septicidal capsule. Seeds subglobose; testa spongy, wing-like; embryo cylindric.—DISTRIB. Tropical Asia and Africa; species 3 or 4.

1. **Gloriosa superba,** *Linn. Sp. Pl.* (1753) p. 305. A herbaceous tall glabrous branching climber; rootstock of arched, solid, fleshy-white, cylindric tubers 6–12 by 1–1½ in., pointed at each end, bifurcately branched or **V**-shaped, producing a new joint at the end of each branch; roots fibrous; stems annual, 10–20 ft. long, given off from the angles of the young tubers, herbaceous. Leaves sessile or nearly so, 3–6 by ¾–1¾ in., scattered or opposite, or sometimes (from the suppression of the internodes) ternately whorled, ovate-lanceolate, acuminate, tip ending in a tendril-like spiral, base cordate; nerves parallel. Flowers large, axillary, solitary, or subcorymbose towards the ends of the branches from the nearness of the leaves, remaining for about 7 days without withering; pedicels 3–6 in. long, the tips deflexed. Perianth-segments reaching 2½ by ⅓–½ in., linear-lanceolate with crisply waved margins, greenish at first, then yellow, passing through orange and scarlet to crimson. Filaments 1½–1¾ in. long, spreading; anthers nearly ½ in. long. Style reaching 2 in. long; the arms about ¼ in. long. Capsules 1¾ by ¾ in., linear-oblong. The change of color which takes place during the time the flowers remain without drooping, has caused a discrepancy in descriptions by several authors, and new species have actually been founded in consequence of the variation. Fl. B. I. v. 6, p. 358; Grah. Cat. p. 221; Wight, Icon. t. 2047; Trim. Fl. Ceyl. v. 4, p. 294; Baker, in Journ. Linn. Soc. v. 17 (1879) p. 457; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1073; Watt, Dict. Econ. Prod. v. 3, p. 506. *Methonica superba*, Lam. Encyc. Méthod. v. 4 (1797) p. 133; Dalz. & Gibs. p. 250 (*Methonia*).—Flowers: July–Oct. VERN. *Bachnág*; *Khadyánág*.

KONKAN: *Stocks*!, *Graham*; Vingorla, *Woodrow*; along the Railway line between Karjat and Kalyan abundant, *Cooke*! GUJARAT: *Graham*.—DISTRIB. Throughout Tropical India; Ceylon, Tropical Africa, Malacca, Cochinchina.

6. **IPHIGENIA,** Kunth.

Herbs with small tunicate corms; stems erect, slender, leafy. Leaves few, scattered, linear, the upper bract-like. Flowers small, erect, solitary or corymbose. Perianth petaloid, 6-partite, stellately spreading, deciduous; segments equal, narrow, clawed. Stamens 6, hypogynous; filaments short, flat; anthers oblong, versatile, introrsely attached. Ovary 3-celled; ovules numerous in each cell; styles 3, shortly connate below, free above, linear, recurved, stigmatose within. Fruit a loculicidal capsule. Seeds subglobose; testa thin, brown, appressed; albumen fleshy; embryo small.—DISTRIB. India, Africa, and Australia; species 4.

Perianth purple; segments linear-subulate ..... 1. *I. indica.*
Perianth whitish; segments oblanceolate ..... 2. *I. pallida.*

1. **Iphigenia indica,** *A. Gray, in Kunth, Enum.* v. 4 (1843) p. 213. Corm subglobose, ½–⅔ in. in diam., narrowed into a short neck, tunicate

with pale brown sheaths; stem 3–10 in. high, rigid or flexuous. Leaves alternate, few, sessile, the lower 6–8 by $\frac{1}{6}$–$\frac{1}{2}$ in., the upper gradually smaller, all narrowly linear or linear-lanceolate, acuminate, coriaceous, base sheathing; nerves obscure. Flowers purple, few or many in a terminal erect raceme; bracts linear or subulate, the lower leafy; pedicels $\frac{1}{2}$–1 in. long. Perianth-segments $\frac{3}{8}$ in. long, narrow, linear-subulate, acute, clawed, spreading or reflexed when the flower is fully expanded. Stamens $\frac{1}{6}$ in. long; filaments flattened; anthers $\frac{1}{20}$ in. long, versatile. Ovary oblong, about as long as the stamens; styles 3, united at the base, $\frac{1}{16}$ in. long, recurved. Capsules oblong-ellipsoid or sub-obovoid, $\frac{3}{8}$–$\frac{5}{8}$ in. long, 3-grooved, obtuse. Seeds $\frac{1}{10}$ in. in diam., ellipsoid or subglobose, brown. Fl. B. I. v. 6, p. 357; Baker, in Journ. Linn. Soc. v. 17 (1879) p. 450; Trim. Fl. Ceyl. v. 4, p. 293; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1074; Watt, Dict. Econ. Prod. v. 4, p. 476. *Anguillaria indica*, Br. Prodr. (1810) p. 273; Grah. Cat. p. 222.—Flowers: June–July. VERN. *Márkallai.*

KONKAN: *Stocks!*, *Law!*, *Nimmo* ex *Graham.* DECCAN: Poona, *Woodrow*; Khandala, *Graham*; Mahableshwar, *H. M. Birdwood.*—DISTRIB. Throughout India; Ceylon, Australia, Philippines.

2. **Iphigenia pallida,** *Baker, in Journ. Linn. Soc.* v. 17 (1879) p. 451. Corm globose, $\frac{1}{2}$ in. thick, tunicate with pale brown sheaths; neck hypogæal; stem above ground 3–4 in. high, flexuous. Leaves usually 4, linear, grass-like, 3–4 by $\frac{1}{8}$–$\frac{1}{4}$ in., the upper smaller. Flowers 1–4, white or tinged with purple, corymbose; bracts linear, foliaceous; pedicels ascending, $\frac{1}{4}$–$1\frac{1}{2}$ in. long. Perianth-segments $\frac{1}{6}$–$\frac{1}{4}$ by $\frac{1}{10}$ in., oblanceolate, acute, many-nerved. Stamens $\frac{1}{10}$–$\frac{1}{8}$ in. long; filaments flattened; anthers $\frac{1}{20}$ in. long, versatile. Ovary obovoid; styles 3, recurved, $\frac{1}{16}$ in. long. Capsules $\frac{1}{3}$ in. long, obovoid. Fl. B. I. v. 6, p. 357; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524.

KONKAN: *Stocks!* DECCAN: Mahableshwar (ticket without authority in Herb. Kew.!). S. M. COUNTRY: Belgaum, *Ritchie*, 739!; Ghâts near Belgaum, *Stocks!*—DISTRIB. India (W. Peninsula), apparently endemic.

7. **SCILLA,** Linn.

Herbs with tunicate bulbs. Leaves radical, linear, lorate or oblong. Flowers in racemes, on a simple leafless scape; bracts small. Perianth petaloid, persistent, stellate or campanulate; segments 6, subequal, often recurved. Stamens 6, adnate at or near the base of the perianth-segments; filaments usually filiform; anthers ovate or oblong, dehiscing introrsely. Ovary 3-celled; ovules usually few in each cell (often 2); style filiform; stigma small, capitate. Fruit a globose 3-lobed loculicidal capsule, the cells 1–2-seeded. Seeds obovoid or subglobose; testa thin, black; embryo shorter than the firm albumen.—DISTRIB. Europe, Temperate Asia; species about 80.

1. **Scilla indica,** *Baker, in Saund. Refug. Bot.* v. 3 (1870) *App.* p. 12. Bulb ovoid or globose, 1–$1\frac{1}{2}$ in. in diam. Leaves appearing with the flowers, 3–6 by $\frac{1}{2}$–1 in., variable, from oblong to lanceolate or oblanceolate, subacute, narrowed into a sheathing petiole, rather fleshy, waved, obtusely keeled, sometimes rooting at the tips, dull green above and often blotched with black, paler and glaucous beneath. Scape

2–5 in. long, rather stout. Flowers greenish-purple, in cylindric, many-flowered racemes 2–4 in. long; bracts minute, scarious; pedicels filiform, ¼–⅜ in. long. Perianth-segments ⅙–¼ by $\frac{1}{16}$–$\frac{1}{12}$ in., linear-oblong, obtuse. Filaments ⅙ in. long, purple; anthers $\frac{1}{16}$ in. long, ellipsoid. Style ⅙–⅕ in. long. Capsules ⅙ in. long and broad, membranous. Fl. B. I. v. 6, p. 348; Baker, in Journ. Linn. Soc. v. 13 (1872) p. 250; Trim. Fl. Ceyl. v. 4, p. 293; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1074; Watt, Dict. Econ. Prod. v. 6, part 2, p. 489. *Scilla maculata*, Baker, in Journ. Linn. Soc. v. 13 (1872) p. 250. *Ledebouria maculata*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 143; Dalz. & Gibs. p. 251. *Ledebouria hyacinthina*, Roth, Nov. Pl. Sp. (1821) p. 195; Wight, Icon. t. 2040; Grah. Cat. p. 220; Dalz. & Gibs. p. 251; Bot. Mag. t. 3226.—Flowers: May–July.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks*! DECCAN: Mahableshwar, very common, appearing with the first fall of rain at the end of May or beginning of June, *Cooke*!, *H. M. Birdwood*; Alandi, *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 733!; Castlerock, *Woodrow*.—DISTRIB. India (Behar, Central India, Chota Nagpur, W. Peninsula); Ceylon, Abyssinia.

8. **URGINEA,** Steinh.

Herbs with tunicate bulbs. Leaves radical, linear or lorate. Flowers racemose on a long leafless scape, often appearing before the leaves; pedicels short or long, articulate; bracts small. Perianth petaloid, campanulate; segments 6, subequal. Stamens 6, adnate at or near the base of the perianth-lobes, included; filaments filiform or thickened at the base; anthers oblong or linear, dehiscing introrsely. Ovary 3-celled, often 3-gonous; ovules numerous in each cell; style tapering towards the base. Fruit an oblong, 3-quetrous, loculicidal capsule. Seeds usually many in each cell, compressed; testa black; embryo rather large; albumen fleshy.—DISTRIB. Species about 24, S. European, W. Asiatic, and African.

1. **Urginea indica,** *Kunth, Enum.* v. 4 (1843) p. 333. Bulb pale, 2–4 in. long, ovoid, thick. Leaves appearing after the flowers, 6–18 by ½–1 in., nearly flat, sub-bifarious, linear, acute. Scape erect, brittle, 12–18 in. long by ⅙–¼ in. diam. at the base. Flowers dingy brown (*Dalzell & Gibson*), very distant, in slender laxly flowered racemes 6–12 in. long; bracts minute, soon falling; pedicels 1–1½ in. long, slender, spreading or decurved. Perianth campanulate; segments ⅜ by $\frac{1}{10}$–⅛ in., oblong-oblanceolate, obtuse, with 2 or 3 strong approximate nerves down the middle. Stamens rather more than ¼ in. long; filaments flattened; anthers $\frac{1}{10}$ in. long. Style obconic. Capsules ellipsoid, tapering to both ends, ½–¾ in. long, the cells 6–9-seeded. Seeds elliptic, ¼ by ⅛ in., flattened, black. Fl. B. I. v. 6, p. 347; Dalz. & Gibs. p. 250; Baker, in Journ. Linn. Soc. v. 13 (1872) p. 222; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1075; Watt, Dict. Econ. Prod. v. 6, part 4, p. 213. *Scilla indica*, Roxb. Fl. Ind. v. 2 (1832) p. 147; Grah. Cat. p. 220 (*not* of Baker).—VERN. *Jangli-piaz.*

KONKAN: *Stocks*!; common on the sandy shores of both Konkans, *Graham, Nairne, Dalzell*; Harni, on the coast below Bombay, *Dalzell & Gibson*.—DISTRIB. India (Western Himalaya, Behar, Chota Nagpur, Birma, W. Peninsula especially near the sea); Tropical Africa.

Used in medicine as a substitute for the true Squill.

9. **DIPCADI,** Medic.

Tuberous scapigerous herbs. Leaves usually narrowly linear. Flowers racemose, bracteate. Perianth tubular; tube cylindric; segments 6, erect, the outer recurved from about the middle, the inner at the tips only. Stamens 6, inserted in the throat of the perianth, included; filaments short or 0; anthers linear, versatile, dehiscing introrsely. Ovary stipitate or sessile, 3-celled; ovules many in each cell; style short, straight; stigma 3-lobed. Capsule membranous, subglobose or broadly obovate, deeply 3-sulcate, sessile or stalked, loculicidally 3-valved, few- or many-seeded. Seeds in each cell 6–20, compressed; testa black, membranous.—Distrib. Europe, W. Asia, Africa; species about 27.

Ovary stipitate.
- Flowers more than ¾ in. long, usually about 1½ in. long ..... 1. *D. concanense.*
- Flowers less than ¾ in. long.
  - Pedicels not longer than the bracts ..... 2. *D. montanum.*
  - Pedicels capillary, longer than the bracts ..... 3. *D. minor.*

Ovary not stipitate ..... 4. *D. erythræum.*

1. **Dipcadi concanense,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 143 (*Uropetalum*). Bulb tunicate, small, ½–¾ in. in diam. Leaves 3-4, subfleshy, 5–10 in. long, semiterete, linear-subulate, scarcely more than $\frac{1}{12}$ in. thick. Scape terete, 6–12 in. long, smooth, naked. Flowers white, in 2–6-flowered racemes 2–5 in. long; bracts ⅛–⅙ in. long, triangular, acuminate, shorter than the pedicels; pedicels ¼–½ in. long. Perianth 1½ in. long; the 3 outer lobes rather less than ½ in. long by $\frac{1}{10}$ in. wide, linear, obtuse, many-nerved; the 3 inner lobes connate to about the middle, the free portion ⅛ in. wide, oblong-lanceolate, obtuse, with 5 close parallel nerves. Filaments flattened, ¼ in. long; anthers ⅛–⅙ in. long. Ovary ⅓ in. long, obovoid, distinctly stalked; style 1 in. long; stigma 3-lobed, the lobes $\frac{1}{20}$ in. long. Capsules broader than long, ⅜ by ½ in. Seeds ellipsoid, flattened, ¼ by ⅛ in., black. Fl. B. I. v. 6, p. 346; Baker, in Journ. Linn. Soc. v. 11 (1870) p. 399; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524. *Uropetalum concanense,* Dalz. in Kew Journ. Bot. v. 2 (1850) p. 143; Dalz. & Gibs. p. 250.

Konkan: rocky places in Malwán, *Dalzell* !—Distrib. India (W. Peninsula), apparently endemic.

2. **Dipcadi montanum,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 142 (*Uropetalum*). Bulb tunicate, globose, 1 in. in diam. Leaves 5–11 by $\frac{1}{16}$–⅛ in., narrowly linear, acute. Scape 8–12 in high, subterete, smooth, naked. Flowers white, in ultimately lax 6–10-flowered racemes 3–4½ in. long; bracts ⅜ in. long, lanceolate, finely acuminate; pedicels ¼–⅜ in. long, filiform. Perianth a little more than ½ in. long; the 3 outer lobes as long as the tube, elliptic-oblong, obtuse, ⅛ in. wide, with 5 close conspicuous parallel nerves in the middle and with an indurated apex. Stamens attached at the base of the perianth-lobes; filaments $\frac{1}{10}$ in. long, flattened; anthers $\frac{1}{12}$ in. long, versatile. Ovary ¼ in. long (including a stalk about $\frac{1}{16}$ in. long), obovoid; style rather less than ¼ in. long; stigma 3-lobed, the lobes about $\frac{1}{32}$ in. long. Capsules stalked, broader than long, reaching ⅜ by ½ in., 3–5-seeded. Seeds ⅛ by $\frac{1}{10}$ in., ellipsoid, flat, dull black. Fl. B. I. v. 6, p. 346; Baker, in Journ. Linn. Soc. v. 11 (1870) p. 398; Woodr. in Journ.

Bomb. Nat. v. 12 (1899) p. 524. *Uropetalum montanum*, Dalz. l. c.; Dalz. & Gibs. p. 250.—Flowers: July–Aug.

DECCAN: Western Deccan, *Dalzell & Gibson*; Sahyadri range, lat. 19°, *Dalzell*!; Junnar near Poona, *Woodrow*! S. M. COUNTRY: Belgaum, *Stocks*!, *Dalzell & Gibson*, *Ritchie*, 1454!—DISTRIB. India (W. Peninsula).

Trimen (Fl. Ceyl. v. 4, p. 291) gives this for Ceylon, but the description renders the identification doubtful.

3. **Dipcadi minor,** *Hook. f. Fl. B. I.* v. 6 (1892) p. 346. Racemes 6–12-flowered; bracts much shorter than the capillary pedicels. Perianth $\frac{1}{3}$–$\frac{1}{2}$ in. long; outer lobes as long as the tube.

There is but one sheet in Herb. Kew. containing a few scraps of the plant collected by Dalzell. The specimens have neither bulbs, leaves, nor fruit. Dalzell on the sheet gives "Hewra Plain" as its habitat. In the 'Flora of British India' (v. 6, p. 346) the localities "Malwán" and "Hewra Plain" have been transposed.

Malwán is given by Dalzell as the habitat of *D. concanense*, Hewra Plain as that of *D. minor*.

4. **Dipcadi erythræum,** *Webb & Berth. Hist. Nat. Canar.* v. 3 (1848) p. 341. Bulb tunicate, $\frac{1}{2}$–$\frac{7}{8}$ in. in diam. Leaves 6–8 by $\frac{1}{8}$–$\frac{1}{5}$ in., narrowly linear. Scape 4–7 in. long. Flowers greenish, in lax 6–12-flowered racemes 4–6 in. long; bracts $\frac{3}{8}$–$\frac{7}{8}$ in. long, the lower the longest, ovate, finely acuminate; pedicels $\frac{1}{6}$–$\frac{1}{3}$ in. long. Perianth campanulate, $\frac{5}{8}$ in. long; outer lobes $\frac{3}{8}$ by $\frac{1}{8}$ in., elliptic-oblong, obtuse, with indurated tips, 7-nerved; inner lobes similar, 5-nerved. Ovary sessile, $\frac{1}{4}$ in. long, elliptic-obovoid. Capsules $\frac{1}{2}$–$\frac{5}{8}$ in. long and as broad, slightly cuneate at the base, on a stout stalk $\frac{1}{8}$–$\frac{1}{4}$ in. long, transversely veined. Seeds $\frac{1}{4}$–$\frac{5}{16}$ in. in diam., orbicular, flat, black. *Dipcadi unicolor*, Baker, in Journ. Linn. Soc. v. 11 (1870) p. 397; Hook. f. Fl. B. I. v. 6, p. 346; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524.

SIND: Jemadar ka Landa near Karachi, *Stocks*, 634!; lower hills of Sind, *Stocks*!, *Dalzell*!—DISTRIB. Arabia, Egypt.

10. ASPHODELUS, Linn.

Annual or perennial herbs; root-fibres slender or fleshy. Leaves radical, linear, 3-quetrous, or terete and fistular. Flowers racemose, on a simple or branched leafless scape; pedicels jointed, solitary in the axils of small scarious bracts. Perianth petaloid, marcescent; segments 6, free or shortly connate below. Stamens 6, hypogynous, shorter than the perianth-segments; filaments dilated at the base, enclosing the ovary; anthers oblong or almost linear, versatile, the filament inserted in a pit at the back of the connective. Ovary 3-celled; ovules 2 in each cell, collateral; style filiform; stigma somewhat 3-lobed. Fruit a globose loculicidal capsule with rugose partitions. Seeds usually solitary in each cell of the capsule; testa black, usually rugose; albumen cartilaginous; embryo rather large.—DISTRIB. Species 6 or 7, S. Europe and eastward to India.

1. **Asphodelus tenuifolius,** *Cav. in Ann. Cienc. Nat.* v. 3 (1801) p. 46, t. 27, fig. 2. Annual. Leaves 6–12 by $\frac{1}{10}$–$\frac{1}{8}$ in., terete, fistulous, acute, sheathing at the base, finely puberulous. Scapes several from the root, smooth or puberulous, much branched in the upper part, 1–2 ft. high. Flowers white, distant, laxly racemose, solitary in each bract; pedicels $\frac{1}{6}$–$\frac{1}{4}$ in. long, jointed below the middle; bracts broadly

ovate, cymbiform, acute, $\frac{1}{10}$ in. long, scarious, with a strong brownish keel. Perianth $\frac{1}{6}$–$\frac{1}{5}$ in. long; segments oblong, obtuse, $\frac{1}{16}$ in. wide, with a strong conspicuous brownish costa. Stamens $\frac{1}{8}$ in. long; filaments slightly fusiform towards the top; anthers $\frac{1}{20}$ in. long. Style $\frac{1}{12}$ in. long; stigma small, subcapitate, minutely 3-lobed. Capsules globose, $\frac{1}{6}$–$\frac{1}{5}$ in. in diam., erect, the valves deeply wrinkled. Seeds $\frac{1}{8}$ in. long, sharply 3-gonous, acute, black. Fl. B. I. v. 6, p. 332; Cav. Icon. t. 587, fig. 2; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1076. *Asphodelus clavatus*, Roxb. Fl. Ind. v. 2 (1832) p. 148; Graham, Cat. p. 219. *A. fistulosus* var. *tenuifolius*, Baker, in Journ. Linn. Soc. v. 15 (1875) p. 272. *Asphodelus pauciflorus*, Wight, Icon. v. 6 (1853) p. 27 (*A. parviflorus* in Tab. 2062). *Asphodelus fistulosus*, Watt, Dict. Econ. Prod. v. 1, p. 346.—Flowers: Nov.–Feb.

DECCAN: Kirkee, *J. G. Woodrow*! GUJARAT: *Woodrow*; Ahmedabad, *Law* ex *Graham*, *Bhiva*!—DISTRIB. Throughout India in fields; westward to the Canary Islands.

11. **CHLOROPHYTUM,** Ker.

Herbs with a short hard rootstock emitting many fascicled roots, often thick and fleshy and tuber-like. Leaves radical, clustered, often broad, rarely linear or lorate. Flowers laxly racemose on a simple or branching leafless scape; pedicels usually fascicled in the axils of small scarious, or large membranous bracts. Perianth petaloid, marcescent or persistent, rarely deciduous; segments free, rotate. Stamens 6, hypogynous, free or the 3 inner adnate to the perianth-segments, included; filaments filiform, often widened above the middle; anthers oblong or linear, dehiscing introrsely, the filament inserted in a small pit on the back of the connective. Ovary 3-quetrous, 3-celled; ovules 4 or more in each cell; style filiform; stigma small. Fruit a coriaceous truncate or emarginate, 3-winged, loculicidal capsule. Seeds broad, usually compressed; testa black; albumen rather hard; embryo often curved, rather large.—DISTRIB. Species about 40, tropical and subtropical.

Flowers in simple or shortly branched dense-flowered racemes.	
Leaves lanceolate or oblanceolate, petiolate.	
Scape 3–6 in. long, naked	1. *C. breviscapum.*
Scape 1–2 ft. long, bracteate	2. *C. glaucum.*
Leaves linear or lorate, not petiolate.	
Scape as long as the leaves; perianth-segments $\frac{1}{3}$ by $\frac{1}{10}$ in., oblanceolate, 5-nerved	3. *C. attenuatum.*
Scape longer than the leaves; perianth-segments $\frac{1}{2}$ by $\frac{1}{6}$ in., oblong, 7-nerved	4. *C. tuberosum.*
Flowers in simple or branched racemes, remotely scattered, solitary or in pairs.	
Leaves $1\frac{1}{2}$–$3\frac{1}{2}$ in. broad; seeds orbicular	5. *C. orchidastrum.*
Leaves $\frac{3}{8}$–$\frac{1}{2}$ in. broad; seeds angular	6. *C. laxum.*

1. **Chlorophytum breviscapum,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 141. Root-fibres with oblong tubers pendulous from them. Leaves 6–9, membranous, 12–14 by $\frac{3}{4}$–$1\frac{1}{2}$ in., linear-oblong or oblong-lanceolate, acuminate, flat, with undulate margins, shining above, pale beneath, attenuated towards the base in a broad petiole. Scape 4–8 in. long (rarely branched), naked. Flowers white, in usually simple racemes 2–4 in. long; bracts membranous, ovate-lanceolate, with a long

acumination, the lower bracts ½–¾, the upper ⅜ in. long; pedicels 2–4-nate, ¼–⅓ in. long, jointed near the top. Perianth rather more than ⅜ in. long; segments linear, acute, 1/12 in. broad, 3-nerved. Stamens ⅓ in. long; anthers ⅛ in. long, linear-oblong. Style ⅛ in. long, slender; stigma minute. Capsules depressed-globose, emarginate, acutely 3-winged, ⅜ in. in diam., the cells 1–3-seeded. Seeds globose, compressed, ⅛ in. in diam., finely papillose, black. Fl. B. I. v. 6, p. 333; Dalz. & Gibs. p. 252; Baker, in Journ. Linn. Soc. v. 15 (1875) p. 323; Watt, Dict. Econ. Prod. v. 2, p. 269.—Flowers: July–Aug.

Stocks without locality in Herb. Kew.! KONKAN: Malwán, *Dalzell*! S.M. COUNTRY: Belgaum Ghâts, *Ritchie*, 1457!—DISTRIB. India (Sikkim Himalaya, W. Peninsula).

2. **Chlorophytum glaucum,** *Dalz. in Kew Journ. Bot.* v. 2 (1850) p. 142. Root-fibres cylindric. Leaves 6–8, membranous, 12–18 by 1–2 in., narrowly oblanceolate, acute, glabrous, glaucous, attenuated into a short broad petiole. Scape strict, erect, simple, 1–2 ft. long, clothed with many narrowly lanceolate sheaths. Flowers white, in simple dense racemes 6–12 by 1 in.; bracts persistent, forming a terminal coma before flowering, lanceolate, acuminate, the lower ¾–1 in. long, the upper ¼–⅓ in. long; pedicels ascending, ¼–½ in. long, slender, jointed at or above the middle, the lower 2–3-nate. Perianth-segments less than ½ in. long by ⅛ in. broad, linear-lanceolate, subobtuse, 5-nerved. Stamens ⅓ in. long; filaments minutely papillose; anthers ⅛ in. long. Style ⅓ in. long; stigma minute. Capsules globose, emarginate, acutely 3-winged, the cells 2-4-seeded. Seeds orbicular, ⅛ in. in diam., compressed, dull black, not papillose. Fl. B. I. v. 6, p. 334; Dalz. & Gibs. p. 252; Baker, in Journ. Linn. Soc. v. 15 (1875) p. 324; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Dalz. & Gibs. p. 252.

Stocks without locality in Herb. Kew.! KONKAN: *Law*!; Sahyadri range, lat. 16°–18°, *Dalzell*! KANARA: *Law*!—DISTRIB. India (W. Peninsula), apparently endemic.

3. **Chlorophytum attenuatum,** *Baker, in Journ. Linn. Soc.* v. 15 (1875) p. 332. Roots fleshy (not or rarely tuberous). Leaves 6–9, membranous, 9–18 by ½–1 in., linear, acute, slightly narrowed at the base, with 15–20 distinct immersed veins. Scape glabrous, naked, erect, as long as the leaves. Flowers white, in simple (rarely forked) racemes 3–6 in. long, dense in the upper part; bracts ovate-lanceolate, acuminate, the upper ⅛–¼, the lower ½–1 in. long; pedicels erect, jointed about the middle, 2–3-nate, ⅛–⅜ in. long. Perianth-segments ⅓ by 1/10 in., oblong-lanceolate or oblanceolate, obtuse, 5-nerved. Stamens ⅕ in. long; filaments ⅛ in. long, longer than the anthers; anthers narrowly linear. Style ¼ in. long. Capsules globose, acutely 3-winged, broadly obcordate, ⅓ in. in diam.; cells 3–4-seeded. Fl. B. I. v. 6, p. 335; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523. *Phalangium attenuatum*, Wight, Icon. v. 6 (1853) p. 21, t. 2037.—Flowers: rainy season.

KONKAN: *Stocks*!, *Law*!—DISTRIB. India (W. Peninsula), apparently endemic.

4. **Chlorophytum tuberosum,** *Baker, in Journ. Linn. Soc.* v. 15 (1875) p. 332. Root-fibres cylindric, with ellipsoid tubers hanging from them. Leaves 6–12, membranous, sessile, 6–12 by ½–1 in., shorter than the scape, usually falcate, recurved, acuminate, the margins

undulate. Scape terete, naked, 3–12 in. long. Flowers white, in simple or shortly branched racemes 2–4 in. long by 1–1½ in. wide when expanded; bracts lanceolate, acuminate, the lower ½–¾ in. long; pedicels ascending, ¼–½ in. long, jointed below the middle. Perianth-segments less than ½ in. long by ⅛ in. broad, oblong-lanceolate, subacute, 7–9-nerved. Stamens ⅓ in. long; anthers ⅙–⅕ in. long, narrowly linear, ultimately twisted. Stigma minute. Capsules obovoid, ⅜ by ¼ in., shining, transversely veined, emarginate, the cells 4–6-seeded. Seeds irregularly orbicular, ⅛ in. in diam., black. Fl. B. I. v. 6, p. 334; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1077. *Chlorophytum anthericoideum*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 141; Dalz. & Gibs. p. 251. *Phalangium tuberosum*, Wight, Icon. v. 6 (1853) p. 21, t. 2036. *Anthericum tuberosum*, Roxb. Fl. Ind. v. 2 (1832) p. 149; Grah. Cat. p. 219.—Flowers: July. VERN. *Kuli*.

KONKAN: *Stocks*!, *Law*!, *Dalzell*! DECCAN: Poona, *Woodrow*, 101!, *Jacquemont*, 555!; Bowdhan near Poona, *Bhiva*!—DISTRIB. India (E. Himalaya, Behar, W. Bengal, Birma, W. Peninsula); Abyssinia.

5. **Chlorophytum orchidastrum,** *Lindl. in Bot. Reg.* (1824) t. 813. Whole plant 3 ft. high; root-fibres tuberous. Leaves 6–9, membranous, 12–24 by ½–3½ in., elliptic-lanceolate, acute, strongly nerved, glabrous and shining on both sides, narrowed at the base into a winged petiole 6–9 in. long. Scape 1 ft. long, thick, terete, naked. Flowers white, in very lax panicles 1–2 ft. long, the branches each with a large lanceolate acute bract reaching sometimes 1½ in. long, at the base; bracts of the inflorescence ¼–½ in. long, ovate-lanceolate; pedicels ascending, usually geminate, ¼–½ in. long, jointed about the middle. Perianth-segments ⅜ by ⅛ in., oblong-lanceolate, subacute, 5-nerved. Stamens ⅓ in. long; anthers ⅕ in. long. Style ¼ in. long. Capsules ¼ by ⅜ in., depressed-globose, deeply lobed at the apex, broader than long, transversely veined. Seed solitary, flattened, rather broader than long, orbicular or subreniform, minutely papillose, dull black. Fl. B. I. v. 6, p. 336; Baker, in Journ. Linn. Soc. v. 15 (1875) p. 325; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523. *Chlorophytum Nimmonii*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 142; Dalz. & Gibs. p. 252. *Phalangium oligospermum*, Wight, Icon. v. 6 (1853) p. 21, t. 2038. *Anthericum Nimmonii*, Grah. Cat. p. 220.—Flowers: July–Aug.

KONKAN: *Stocks*!, *Dalzell*! S. M. COUNTRY: Cheeta Hill, Belgaum, *Ritchie*, 1460!—DISTRIB. India (W. Peninsula); Tonkin, Tropical Africa.

6. **Chlorophytum laxum,** *R. Br. Prodr.* (1810) p. 277. A low plant rarely exceeding 1 ft. high; root-fibres usually with small oblong tubers hanging from them. Leaves 6–12, grass-like, 6–12 by ⅛–¼ (rarely ½) in., subdistichous, usually spreading and recurved, longer than the scape, narrowly linear, falcate, flat or folded, acute, glabrous, with numerous conspicuous nerves. Scape very slender, flexuous, 1–3 in. long, naked. Flowers few, greenish-white, very distant (sometimes 1 in. apart), in lax very slender simple or forked racemes 3–10 in. long, with scarious ovate-lanceolate acuminate bracts ⅝ in. long at the base of the branches when forked; bracts of the inflorescence the lower ¼, the upper ⅛ in. long, ovate, acuminate; pedicels jointed about the middle, short, becoming longer and drooping in fruit, the lower sometimes geminate.

Perianth-segments $\frac{1}{8}$–$\frac{1}{6}$ by $\frac{1}{16}$ in., oblong, obtuse, obscurely 3-nerved. Stamens alternately short and long, the longer $\frac{1}{12}$, the shorter $\frac{1}{16}$ in. long; anthers $\frac{1}{30}$ in. long, subglobose, green. Style $\frac{1}{25}$ in. long. Capsules $\frac{1}{6}$ by $\frac{1}{4}$ in., broadly obcordate, 3-winged, the cells 1-4-seeded. Seeds $\frac{1}{8}$ in. across, irregularly angled, black, minutely papillose. Fl. B. I. v. 6, p. 336; Trim. Fl. Ceyl. v. 4, p. 290; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523. *Chlorophytum laxiflorum*, Baker, in Journ. Linn. Soc. v. 15 (1875) p. 328 (by error). *C. parviflorum*, Dalz. in Kew Journ. Bot. v. 2 (1850) p. 141; Dalz. & Gibs. p. 251.—Flowers: July.

Dalzell without locality in Herb. Kew.! KONKAN: *Dalzell*! DECCAN: *Cooke*! S. M. COUNTRY: Kákti Hills, Belgaum, *Ritchie*, 1458!; Dharwar, on stony ground, *Talbot*, 2498! KANARA: Tinai Ghát (N. Kanara), *Talbot*, 2553!—DISTRIB. India (W. Peninsula); Ceylon, China, Borneo, Tropical Africa and Australia.

A large number of non-indigenous plants belonging to the Order are grown in gardens, of which a few of the most common are the following:—

Aloe vera, Linn. Sp. Pl. (1753) p. 320. A native of the Mediterranean region. Leaves ensiform, dense, aggregate, 2–4 in. broad, narrowed from base to apex, pale green, with distant horny prickles on the margins. Scape 2–3 ft. long, simple or branched. Raceme dense, 6–12 in. long. Perianth yellow, cylindric, $\frac{3}{4}$–1 in. long. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Watt, Dict. Econ. Prod. v. 1, p. 186.—VERN. *Yellia*.

Aloe variegata, Linn. Sp. Pl. (1753) p. 321. A native of S. Africa. Leaves close, erecto-patent, 4–5 by 1 in., lanceolate, bright green spotted with grey and with whitish denticulate margins. Scape simple, tapering, 6–8 in. long. Raceme simple, 3–4 in. long. Perianth reddish, 1–$1\frac{1}{2}$ in. long. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523.—VERN. *Chota-Yellia*.

Agapanthus umbellatus, L'Hérit. Sert. Angl. (1788) p. 17. A native of S. Africa known as the *African Blue Lily*, introduced into Bombay by Nimmo. Leaves numerous, radical, linear, somewhat fleshy. Scapes tall, bearing many-flowered umbels of bright blue flowers. Perianth funnel-shaped. The plant grows well at Mahableshwar, but when brought to the plains, flowers freely for a time and then dies. Grah. Cat. p. 217; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523, & Gard. in Ind. ed. 5, p. 497.—Flowers: May.

Yucca gloriosa, Linn. Sp. Pl. (1753) p. 319. A native of the West Indies known as *Adam's Needle*, almost naturalized in Indian gardens. A magnificent aloe-like plant with lanceolate, sharp-pointed leaves and bearing during the rainy season a large panicle of creamy-white flowers as large as a hen's egg. Grah. Cat. p. 221; Dalz. & Gibs. Suppl. p. 93; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523, & Gard. in Ind. ed. 5, p. 502; Watt, Dict. Econ. Prod. v. 6, part 4, p. 321.—VERN. *Yacca*.

Yucca aloifolia, Linn. Sp. Pl. (1753) p. 319. A native of the West Indies to North Carolina. Tall, with a slender stem 10–15 ft. high. Leaves 50–100, rigid, ensiform, 1–$1\frac{1}{2}$ ft. by 1–$1\frac{1}{4}$ in., somewhat glaucous,

with a pungent reddish-brown horn at the tip, the margins whitish, serrulate. Flowers in dense rhomboid panicles 1–2 ft. long, with ascending branches. Perianth white, 1½–2 in. long. Grah. Cat. p. 221; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Bot. Mag. t. 1700.

· *Cordyline terminalis*, Kunth, Enum. v. 5 (1850) p. 25. A native of the South Sea Islands, largely cultivated in tropical countries. It is an erect glabrous shrub 8–10 ft. high, with distichous green or purplish, oblong-lanceolate acuminate leaves, narrowed at the base, 1–3 ft. by 2–5 in., and subsessile white flowers in branched panicles. Fl. B. I. v. 6, p. 331; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523, & Gard. in Ind. ed. 5, p. 516; Prain, Beng. Pl. p. 1072.

The so-called *Dracænas* of Indian gardens are mostly forms or varieties of this plant.

Var. *ferrea*, Baker, in Journ. Linn. Soc. v. 14 (1874) p. 540. Leaves narrower, more oblanceolate, dull purple or variegated, 2-2½ in. broad; flowers usually smaller, tinged with purple. *Dracæna ferrea* (sp.), Linn. Syst. ed. 12 (1767) p. 246; Bot. Mag. t. 2053; Grah. Cat. p. 221; Dalz. & Gibs. Suppl. p. 93. Common in gardens, introduced from China (*Graham*).

Allium ascalonicum, Linn. Amœn. Acad. v. 4 (1759) p. 454. Leaves fistular, basal only; heads dense, with flowers only. *The Shallot*, cultivated. Fl. B. I. v. 6, p. 337; Grah. Cat. p. 220; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1075; Watt, Dict. Econ. Prod. v. 1, p. 168.

Allium Cepa, Linn. Sp. Pl. (1753) p. 300. Leaves fistular, subdistichous; heads dense, with flowers and bulbils. *The Onion*, much cultivated as a cold season crop throughout the Deccan and Gujarat. The Onions of Bombay are well known and celebrated throughout India. Fl. B. I. v. 6, p. 337; Grah. Cat. p. 220; Dalz. & Gibs. Suppl. p. 92; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1075; Watt, Dict. Econ. Prod. v. 1, p. 169.—Vern. *Piáz.*

Allium ampeloprasum, Linn. Sp. Pl. (1753) p. 294. Leaves flat; heads dense, bearing flowers only; bulb long cylindric, simple. *The Leek*, cultivated. Fl. B. I. v. 6, p. 337; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1075. *Allium Porrum*, Linn. Sp. Pl. (1753) p. 295; Roxb. Fl. Ind. v. 2 (1832) p. 141; Grah. Cat. p. 221; Dalz. & Gibs. Suppl. p. 92; Watt, Dict. Econ. Prod. v. 1, p. 171 (*Porum*).—Vern. *Khorát.*

Allium sativum, Linn. Sp. Pl. (1753) p. 296. Leaves flat; heads lax, bearing both flowers and bulbils; bulb short, compressed. *Garlic*, widely cultivated in irrigated lands of the Deccan and S. M. Country. Fl. B. I. v. 6, p. 337; Grah. Cat. p. 220; Dalz. & Gibs. Suppl. p. 92; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523; Prain, Beng. Pl. p. 1075; Watt, Dict. Econ. Prod. v. 1, p. 172.—Vern. *Lasan.*

Lilium neilgherrense, Wight, Icon. v. 6 (1853) p. 20, tt. 2031–32. A native of the Nilghiri and Pulney Hills, growing about 3 ft. high. Leaves lanceolate, shining, 5 by ¾ in., 3–5-nerved. Flowers white,

tinged with green outside, trumpet-shaped, 8 in. or more long and 5 in. across at the mouth, fragrant. Fl. B. I. v. 6, p. 350; Woodr. Gard. in Ind. ed. 5, p. 501.

Lilium giganteum, Wall. Tent. Fl. Nep. (1826) p. 21, tt. 12, 13. A splendid species, a native of the Himalayas, with a tall stem reaching 10 ft. high. Lower leaves ovate, cordate, 1 ft. or more long and broad, with petioles 9–12 in. long. Racemes 1–2 ft. long; flowers 5–7 in. long and 4 in. across, fragrant, white, slightly tinged with green outside and with a purplish throat. Fl. B. I. v. 6, p. 349; Woodr. Gard. in Ind. ed. 5, p. 502; Watt, Dict. Econ. Prod. v. 4, p. 640.—Flowers: Aug.–Sept.

Dianella ensifolia, Redouté, Lil. v. 1 (1802) t. 1. Stem 3–6 ft. high, rigid. Lower leaves 1–2 ft. by $\frac{3}{4}$–$1\frac{1}{2}$ in., linear-lanceolate, Flowers inodorous, white, greenish or bluish, in panicles 1–2 ft. long. Perianth $\frac{1}{4}$–$\frac{1}{3}$ in. long. Berry dark purple or blue, $\frac{1}{3}$ in. in diam. A native of the Tropical Himalaya, the Khasia Hills, Birma, and Ceylon, often grown in gardens. Fl. B. I. v. 6, p. 337; Dalz. & Gibs. Suppl. p. 93; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 523.

Order CXXXIII. PONTEDERIACEÆ.

Fresh-water and marsh herbs, erect or floating. Leafy stems 1-foliolate, springing from the buried rootstock or from the joints of the floating stem; basal leaf long-petiolate, blade floating or upraised. Flowers hermaphrodite, racemose or spicate, rarely fasciculate or paniculate at the ends of 1-leaved stems or branches; bract under inflorescence spathe-like; bracts under the flowers minute or obsolete. Perianth inferior, petaloid, marcescent, usually tubular; lobes 6, sub-2-seriate, similar or the 3 inner smaller. Stamens 6 or 3, unequally adnate to the perianth-tube or the base of the perianth-lobes, usually declinate, the upper shorter; filaments free; anthers oblong (rarely ovate), with 2 parallel distinct cells. Ovary superior, 3-celled with axile placentas, or 1-celled with parietal placentas, each placenta with many 2-seriate ovules (sometimes only one in each cell fertile), anatropous; style filiform or columnar; stigma terminal, entire or lobed. Fruit a dry, membranous, loculicidally 3-valved (rarely indehiscent) capsule. Seeds ovoid or ellipsoid, small; testa longitudinally ribbed; albumen floury or horny; embryo central, cylindric.—Distrib. Genera 5; species about 36.

1. MONOCHORIA, Presl.

Aquatic herbs; rootstock creeping, clothed with leaf-sheaths. Leaves radical and solitary at the top of the emerging stem or branches, ovate-cordate, sagittate or lanceolate; petioles of the radical leaves long, those of the cauline leaves shorter. Flowers in a raceme, sessile within the axil of the cauline leaf and fasciculately long-pedicellate, or pedunculate and subspicately short-pedicellate. Perianth campanulate; tube 0; lobes 6, distinct, subequal. Stamens 6, adnate to the base of the perianth-lobes, or hypogynous, one usually largest with its filament toothed on one side; anthers basifixed, dehiscing by a terminal ultimately elongate slit. Ovary 3-celled; ovules many in each cell; style filiform;

stigma minutely 3-lobed. Fruit an oblong membranous loculicidal capsule. Seeds many, ovoid, obtuse, many-ribbed; embryo cylindric in the centre of floury albumen.—DISTRIB. Species about 6, in the tropics of the Old World.

Rootstock elongate, creeping; leaves hastate, sagittate, or cordate; flowers on long pedicels, subumbellate or racemose; inflorescence centrifugal	1. *M. hastæfolia.*
Rootstock short, suberect; leaves ovate; flowers on short pedicels, subspicate; inflorescence centripetal	2. *M. vaginalis.*

1. **Monochoria hastæfolia,** *Presl, Reliq. Hœnk.* v. 1 (1830) p. 128. Rootstock stout, creeping and rooting below, spongy, clothed with the remains of old sheaths. Leaves 4–8 by 2–6 in., sagittate, hastate, or cordate, obtuse, acute, or acuminate, smooth and glossy, many-nerved, the basal sinus more or less deep; petioles of the floral leaves tumid above and embracing spathe-like the short stout peduncle; petioles of the radical leaves 1½–2 ft. long with a broad sheathing base. Inflorescence centrifugal; flowers of a brilliant purplish-blue, crowded, racemose or subumbellate; pedicels variable in length, rarely reaching as much as 1 in. long. Perianth-segments ⅝ in. long, twisting corkscrew-fashion round the fruit when withering; large segments obovate, ¼ in. wide, the smaller segments oblong, ⅛ in. wide, all with 3 strong parallel nerves in the middle and finely veined at each side of the nerves, reticulately so towards the margin. Filament of the large anther ⅛ inch long with an acute horn $\frac{1}{12}$ in. long at one side; anthers linear-oblong, the large anther blue, ⅕ in. long, the small anthers yellow, rather more than ⅛ in. long. Ovary ellipsoid or ovoid, ⅛ in. long; style ¼ in. long; stigma obscurely 3-lobed. Capsules ⅜ in. long, ellipsoid. Seeds ellipsoid, rounded at both ends, $\frac{1}{30}$ in. long, pale, with many fine brown ribs. Fl. B. I. v. 6, p. 362; Trim. Fl. Ceyl. v. 4, p. 295; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1079. *Monochoria hastata,* Solms-Laub. in DC. Monogr. Phan. v. 4 (1883) p. 523. *Pontederia hastata,* Linn. Sp. Pl. (1753) p. 288; Grah. Cat. p. 222; Dalz. & Gibs. p. 249; Roxb. Cor. Pl. v. 2, t. 111.—Flowers: Dec.

Margins of tanks and water-holes common, *Dalzell & Gibson.* Rice-fields and margins of tanks, *Graham.* DECCAN: Poona, *Cooke!*; Sholapur, *Woodrow.*—DISTRIB. Throughout India; Ceylon, Malay Islands, China.

2. **Monochoria vaginalis,** *Presl, Reliq. Hœnk.* v. 1 (1830) p. 128. Rootstock short, suberect, spongy. Leaves very variable, 2–4 by 1¼–2 in., from linear to ovate or ovate-cordate, usually acuminate; petioles of the lower leaves long, stout, terete, the peduncles emerging from the channelled sheaths of the uppermost leaves. Inflorescence centripetal; flowers blue, usually spotted with red; in subspicate racemes which are globose at first, the rhachis lengthening as the flowers expand, the terminal flower opening first; pedicels short, ⅛–¼ in. long. Perianth campanulate, 6-partite, the segments ⅜ in. long, nearly equal in length, 3 of them narrowly obovate, nearly ⅛ in. wide, broader than the other 3 which are linear-oblong, $\frac{1}{16}$–$\frac{1}{12}$ in. wide. Filament of the large anther ⅕ in. long, with an acute horn at one side, the filaments of the smaller anthers filiform, ⅕ in. long; anthers linear-oblong, the larger anther $\frac{1}{10}$ in. long, the smaller anthers $\frac{1}{16}$ in. long. Ovary $\frac{1}{10}$ in. long, ellipsoid, glandular; style ⅛ in. long; stigma 3-lobed. Fruit ellipsoid, less than

½ in. long, glandular outside. Seeds $\frac{1}{30}$ in. long, ellipsoid, rounded at each end, pale, with many brown ribs. Fl. B. I. v. 6, p. 363; Solms-Laub. in DC. Monog. Phan. v. 4 (1883) p. 524; Trim. Fl. Ceyl. v. 4, p. 295; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1079. *Pontederia vaginalis*, Burm. Fl. Ind. (1768) p. 80; Roxb. Cor. Pl. v. 2, t. 110; Grah. Cat. p. 222; Dalz. & Gibs. p. 249.—Flowers: Dec.

Rice-fields and margins of tanks common, *Graham, Dalzell & Gibson. Stocks* without locality in Herb. Kew.! KONKAN: Vingorla, *Woodrow*!—DISTRIB. Throughout India; Ceylon, Singapore, Malay Islands, China, Japan, Tropical Africa.

ORDER CXXXIV. XYRIDACEÆ.

Erect, tufted, rush-like, scapigerous, glabrous herbs. Leaves radical, elongate, linear or subulate; sheaths short. Scape stout or slender, as long as or shorter than the leaves, terete, angled or compressed, naked. Flowers hermaphrodite, sessile in the rigid, dark brown, imbricating bracts of a terminal globose or ovoid cone-like head or spike, opening one at a time; bracts orbicular or obovate, coriaceous, convex, persistent. Perianth inferior, 2-seriate. Sepals (or bracteoles) 3, deciduous, membranous, the 2 lateral small (like bracteoles), narrowly boat-shaped, arched, keeled or winged, the dorsal sepal petaloid, broader, arching over the young flowers, sometimes absent. Petals 3, clawed, obovate or spathulate, colored. Stamens 3, perfect, shorter than the corolla-lobes and attached near their bases; anthers sagittate, 2-celled, dorsi-fixed, dehiscing longitudinally; staminodes 3, alternating with the corolla-lobes or 0. Ovary superior, 1-celled or imperfectly 3-celled; placentas 3, basal and confluent or parietal; ovules numerous, orthotropous; style usually 3-fid, with long arms; stigmas capitate or dilated. Fruit a loculicidally 3-valved capsule, or with the top circumscissile. Seeds minute, oblong, strongly ribbed; embryo minute, in floury albumen. —DISTRIB. Genera 2, one (*Xyris*) found in all warm regions, the other American; species about 50.

1. XYRIS, Linn.

Characters of the Order.

1. **Xyris indica,** *Linn. Sp. Pl.* (1753) p. 42. An erect annual 6–20 in. high. Leaves usually shorter than, but sometimes as long as the scape, $\frac{1}{8}$–$\frac{3}{8}$ in. broad, spongy, linear, narrowed to an obtuse or acute tip. Scape stout, deeply grooved and acutely angled. Flowers in ellipsoid spikes ½–¾ in. long; bracts many, orbicular or cuneately obovate, usually broader than long, dark red-brown, shining, very coriaceous, with scarious margins. Flowers bright yellow, ½ in. across. Lateral sepals narrowly boat-shaped, dorsally winged, the wing serrulate. Claw of petals as long as the sepals; limb obovate or suborbicular, erose, veined. Filaments short, broad; anthers oblong, $\frac{1}{30}$ in. long. Style, including the 3 arms, $\frac{1}{20}$ in. long, the arms about $\frac{1}{40}$ in. long; stigmas truncate. Capsules ovoid, ⅛ in. long. Seeds minute, ellipsoid, very strongly ribbed. Fl. B. I. v. 6, p. 364; Grah. Cat. p. 223; Dalz. & Gibs. p. 259; Trim. Fl. Ceyl.

v. 4, p. 297 ; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1080 ; Watt, Dict. Econ. Prod. v. 6, part 4, p. 321.— Flowers : Nov.–Jan. VERN. *Dadumari.*

KONKAN : *Stocks* !, *Dalzell* !, *Graham* ; salt marshes in the S. Konkan, *Dalzell & Gibson.* S. M. COUNTRY : Londa, *Woodrow.*—DISTRIB. India (Bengal, Birma, Assam, W. Peninsula) ; Ceylon, Malay Islands.

The natives of Bengal esteem the plant as a certain cure for ringworm. See Watt, Dict. Econ. Prod. l. c.

ORDER CXXXV. COMMELINACEÆ.

Herbs prostrate or erect, rarely climbing, very rarely shrubby. Leaves costate, with sheathing bases ; nerves parallel. Flowers more or less irregular, hermaphrodite or by abortion polygamous, often cymose ; cymes scorpioid, straight or reduced to one flower, sometimes paniculate, often enclosed in spathe-like bracts ; floral bracts usually small, opposite the pedicels or obsolete, sometimes herbaceous and dichotomously imbricate. Perianth inferior, 6-partite, 2-seriate ; outer segments 3, herbaceous, often persistent ; inner segments 3, petaloid, free or united into a tube below, spreading above, marcescent. Stamens 6, adnate to the base of the perianth-segments, all perfect or 2 or more reduced to staminodes ; filaments often bearded with jointed hairs ; anthers oblong or globose, often dissimilar. Ovary 3- or 2-celled, free ; ovules solitary or few, on the inner angles of the cells, orthotropous. Fruit a loculicidal capsule or indehiscent, with a thin fragile or a succulent pericarp. Seeds angled ; testa smooth or rugose ; albumen floury ; embryo minute, remote from the hilum. — DISTRIB. Genera 25 ; species about 300, tropical and subtropical.

Stamens 3 perfect, 1–3 staminodes.
- Cymes enclosed in spathaceous bracts ..... 1. COMMELINA.
- Cymes paniculate ; bracts not spathaceous ..... 2. ANEILEMA.

Stamens 6 perfect.
- Petals united below into a tube ; cymes scorpioid ..... 3. CYANOTIS.
- Petals free ; cymes secund, in thyrsoid panicles ..... 4. FLOSCOPA.

1. COMMELINA, Linn.

Herbs usually slender and creeping below. Leaves with lax sheaths, petiolate or not. Flowers in usually 2-fid scorpioid cymes emerging singly from a terminal complicate, or funnel-shaped, or hooded spathe ; flowers of the upper cyme-branch small, deciduous, of the lower fertile ; fruiting pedicel and capsule retracted within the spathe. Sepals 3, membranous, the 2 inner often connate below. Petals 3, longer than the sepals, two large, clawed, the third smaller, subsessile. Stamens 3 perfect, with 2–3 imperfect ; anthers oblong, one usually longer than the others. Ovary 3 (rarely 2) -celled, 2 of the cells 1–2-ovulate, the third cell if present 1-ovulate or empty. Fruit a loculicidal capsule hidden in the spathe by the decurving of the pedicel after flowering, the posticous cell sometimes indehiscent or obsolete, or the 2 anticous cells empty, indehiscent, and connate as a ligulate body, from which the posticous cell falls away. Seeds ellipsoid or angled ; testa reticulate, pitted or rugose.—DISTRIB. Species about 90, tropical and subtropical.

Ovary 3-celled, the 2 anticous cells 2-ovulate, the posticous 1-ovulate or obsolete.
- Capsule 3-celled, the 2 anticous cells loculicidally dehiscent, each usually 2-seeded, the posticous cell keeled, 1-seeded and deciduous, at length dehiscent; seeds free in the cells.
  - Spathes complicate, the margins free or connate at the very base only.
    - Spathes sessile; seeds transversely grooved ..... 1. *C. subulata.*
    - Spathes pedunculate.
      - Seeds reticulate, cylindric; spathes sometimes cordate at the base ..... 2. *C. nudiflora.*
      - Seeds smooth, truncate at one end; spathes always rounded at the base.
        - Branches of cyme equal; seeds appendaged ..... 3. *C. salicifolia.*
        - Branches of cyme unequal; seeds not appendaged ..... 4. *C. Hasskarlii.*
  - Spathes turbinate; capsule always 5-seeded; seeds closely pitted ..... 5. *C. benghalensis.*

Capsule 3-celled; anticous cells 0–2-seeded; posticous cell not keeled, 1-seeded, indehiscent, deciduous; seed free or adnate to the cell.
- Stem erect; peduncle of spathe reaching 2 in. long; flowers yellow, drying blue ..... 6. *C. hirsuta.*
- Stems diffuse, rooting at the nodes; peduncle of spathe less than ½ in. long; flowers blue ..... 7. *C. Forskalæi.*

Capsule 2-celled (rarely with a dorsal cell, which is empty or contains an imperfect seed); lateral cells 1–2-seeded.
- Capsules constricted in the middle, bicuspidate; seeds not appendaged ..... 8. *C. clavata.*
- Capsules not constricted in the middle, not bicuspidate; seeds appendaged at each end ..... 9. *C. attenuata.*

All the cells of the ovary 1-ovulate.
- Capsule 3-celled, subequally 3-valved; seeds free in the cells.
  - Spathe sessile or nearly so; capsule trigonous-obovoid ..... 10. *C. obliqua.*
  - Spathe pedunculate; capsules quadrate-oblong ..... 11. *C. paleata.*
- Capsule 3-celled, 2-valved; seed adnate to the cell ..... 12. *C. albescens.*

1. **Commelina subulata,** *Roth, Nov. Pl. Sp.* (1821) p. 23. Nearly glabrous; root fibrous; stem erect, slender, 8–16 in. high, simple or branched. Leaves 1–3 by $\frac{1}{10}$–$\frac{1}{8}$ in., linear, glabrous or nearly so, the sheaths reaching ½ in. long, with glabrous or ciliate margins. Peduncles $1\frac{1}{2}$ inch long, scattered, but often 2–3 together towards the apices of the branches. Spathes ¼–⅜ in. long, falcate, acute, pubescent, green or striate with purple, base cordate. Flowers small, orange-purple, when dry violet (*C. B. Clarke*). Capsules small, 5 (rarely 3)-seeded, at first 2-, but afterwards, from the dorsal valve becoming 2-partite, 3-valved. Seeds black, puberulous, slightly compressed, deeply transversely grooved. Fl. B. I. v. 6, p. 369; Clarke, in DC. Monog. Phan. v. 3, p. 148; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524.

This has been included on the authority of Woodrow (Journ. Bomb. Nat. l. c.), but, as he gives no locality, it would seem as if he had himself never found the plant.

There are in all only 3 sheets in Herb. Kew., one a wretched fragment from Wight's

and the other two from Rottler's Herbarium. There is nothing to show that the plant is indigenous to Bombay. The habitat (Peninsular India) embraces a very wide area. —DISTRIB. Tropical Africa, Abyssinia.

2. **Commelina nudiflora,** *Linn. Sp. Pl.* (1753) p. 41. Diffuse, nearly glabrous; root fibrous; stems 2–3 ft. long and upwards, branching from the base; branches prostrate or subscandent, often rooting at the rather distant nodes, the tips ascending. Leaves sessile, 1½–3 by ⅖–⅔ in., lanceolate or ovate-lanceolate, acute or acuminate, glabrous or puberulous, the sheaths sometimes exceeding ¾ in. long, loose, glabrous, usually with ciliate margins. Peduncles ½–⅝ in. long, spreading or erect. Spathes ¾–1¼ in. long, ovate or ovate-lanceolate, acute or acuminate, base rounded or cordate with rounded lobes, glabrous or pubescent. Cymes usually two, 1- to 3-flowered; flowers ½–⅔ in. across, the two interior petals obovate with long claws, dark blue, the exterior subsessile, orbicular, of a paler blue or nearly white, sometimes subobsolete. Ovary 3-celled, of which two cells are 2-ovulate, the third 1-ovulate. Capsules ⅕ in. long, broadly oblong, acuminate, coriaceous, 5-seeded. Seeds oblong-cylindric, tuberculate and reticulate, brown. Fl. B. I. v. 6, p. 369; Grah. Cat. p. 223; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 144; Trim. Fl. Ceyl. v. 4, p. 300; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1081; Watt, Dict. Econ. Prod. v. 2, p. 516.—*Commelina communis*, Walter, Fl. Carol. (1788) p. 68; Dalz. & Gibs. p. 252.—Flowers: Dec. VERN. *Gandolgi.*

Common everywhere in the Konkan, Deccan, and S. M. Country.—DISTRIB. Throughout India; Ceylon, Singapore, and many tropical and subtropical countries.

3. **Commelina salicifolia,** *Roxb. Fl. Ind.* v. 1 (1832) p. 172. Stems slender, decumbent, sometimes rooting, glabrous, with long internodes. Leaves 3–6 by ⅛–½ in., linear-lanceolate, glabrous or nearly so; sheaths ⅝–1 in. long, ciliolate. Spathes 1–2 in. long, ovate-lanceolate, axillary, acute or acuminate, glabrous, base rounded; peduncles ½–1¼ in. long, slender. Flowers small, polygamous; branches of the cyme equal, usually 1–2-flowered. Sepals free, ovate, obtuse, the 2 inner connate below, larger than the outer. Petals dark blue, the 2 larger ovate with undulate margins and long claws, the smaller one broadly ovate, entire, subsessile or with a very short claw. Stamens 3 fertile; one anther large, lunate, the other two smaller, ellipsoid; staminodes 3, clavate. Capsules ¼ in. long, quadrate, membranous. Seeds black, powdered with white, smooth, ovoid or subglobose, ⅛ in. long, appendaged at one end with a whitish membranous appendage. Fl. B. I. v. 6, p. 370; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 157; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1082; Watt, Dict. Econ. Prod. v. 2, p. 516.—Flowers: Oct.–Dec.

KONKAN: *Woodrow.* S. M. COUNTRY: Belgaum, *Ritchie*, 751!—DISTRIB. India (Bengal, Assam, Birma, W. Peninsula); Java.

4. **Commelina Hasskarlii,** *Clarke, Comm. & Cyrt. Beng.* (1874) p. 13, t. 3. Stem much-branched, glabrous or pubescent, sometimes scaberulous. Leaves 1–3 by ½–⅔ in., narrowly lanceolate, subacute; sheaths ½ in. long, with a broad base, ciliate. Spathes ½–1 in. long, axillary, scattered, ovate-lanceolate, cordate at the base with rounded

lobes, glabrous, scabrid, or hispid; peduncles ½–1 in. long. Flowers in pubescent cymes, the upper branch 2–4- the lower 1–2-flowered. Capsules ¼ in. long, quadrate, subtruncate, apiculate, membranous. Seeds ⅙–⅛ in. long, cylindric, truncate at one end, subacute or rounded at the other, without an appendage. Fl. B. I. v. 6, p. 370; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 157; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1082.—Flowers: Aug.–Nov.

Not common. KONKAN: *Law*! DECCAN: *Cooke*!; Poona, *Woodrow*.—DISTRIB. India (Upper Gangetic Plain, Bengal, Assam, Malwa, W. Peninsula).

5. **Commelina benghalensis,** *Linn. Sp. Pl.* (1753) p. 41. Stem 2–3 ft. long, slender, dichotomously branched from the base upwards; branches diffuse, glabrous or pubescent, creeping and rooting below. Leaves 1–3 by ½–1½ in., ovate or oblong, obtuse, sessile or shortly petiolate, pubescent or villous on both surfaces, base unequal-sided, rounded, cuneate or cordate; nerves 7–11 pairs; sheaths short or long, pubescent or villous, the margins ciliate or sometimes bearded with rufous hairs. Spathes 1–3 together, funnel-shaped or turbinate, auricled on one side, pubescent or hirsute; peduncles very short or 0. Upper branch of cyme 2–3-flowered; the lower 1–2-flowered, not uncommonly depauperate or obsolete. Sepals small, oblong, pubescent. Petals blue; larger petals orbicular or transversely oblong. Anthers oblong. Ovary 3-celled, 2 cells 2-ovulate, 1 cell 1-ovulate. Capsules ¼ in. long, pyriform, membranous, 5-seeded. Seeds oblong, closely pitted. Fl. B. I. v. 6, p. 370; Grah. Cat. p. 223; Dalz. & Gibs. p. 253; Wight, Icon. t. 2065; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 159; Trim. Fl. Ceyl. v. 4, p. 301; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1082; Watt, Dict. Econ. Prod. v. 2, p. 515.—Flowers: Aug.–Dec.

KONKAN: Bombay, *Stocks*!, *Dalzell*! DECCAN: *Cooke*!; Deccan hills, *Stocks*!; Poona, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 752! GUJARAT: Baroda, *Woodrow*.

From the lower nodes sometimes leafless underground branches proceed, bearing much depauperated scapes containing flowers white in color and smaller than the blue flowers produced in light. These flowers mature abnormal papery, 1–2-celled, 1–2-seeded capsules with abundance of usually abnormal unequal, large seeds, which ripen underground and are perfect, whereas perfect seeds are often wanting in the aërial flowers. — DISTRIB. Throughout India; Ceylon, China, Tropical Asia and Africa.

6. **Commelina hirsuta,** *Clarke, in DC. Monog. Phan.* v. 3 (1881) p. 163 (*not* of Br.). A low usually hirsute herb; stems erect, branched from the base, 6–12 in. long. Leaves 2–3½ by ¼–½ in., linear-lanceolate, obtuse, acute, or acuminate, more or less hirsute on both surfaces; sheaths ½–⅝ in. long, villous, striate. Spathes ⅔–1¼ in. long, acuminate, hirsute or villous, ciliate, base cordate; peduncles ¾–2 in. long, hirsute. Flowers yellow, drying deep blue (*C. B. Clarke*). Sepals small, ovate, obtuse, speckled with brown spots. Petals 3, the two larger orbicular with crenulate margins and a long claw, the smaller petal almost as large as the others, sessile. Stamens 3 fertile; filaments long, slender, spirally twisted; staminodes 2. Ovary hairy; style long, filiform; stigma simple. Capsules ⅛ in. long, with the lateral cells empty; lateral valves linear; dorsal ellipsoid, subrugose. Seed ellipsoid. Fl. B. I. v. 6,

p. 371 ; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524. *Heterocarpus hirsutus*, Wight, Icon. v. 6 (1853) p. 29, t. 2067.—Flowers : Aug.–Oct.

Belgaum, *Ritchie*, 751 !

There is in Herb. Kew. but one specimen of the plant from the Bombay Presidency named by Mr. Clarke, and collected by Dr. Ritchie at Belgaum.—Distrib. India (W. Peninsula).

7. **Commelina Forskalæi,** *Vahl, Enum.* v. 2 (1806) p. 172. Stems long, branched, slender, diffuse, rooting at the nodes. Leaves 1–2 by ¼–½ in., glabrous or puberulous, narrowly oblong, obtuse or subacute, narrowed at the base, the margins usually undulate or crenulate ; sheaths ⅓–½ in. long, finely striate, pubescent, ciliate. Spathes ½ in. long and about ⅜ in. wide, broadly ovate, complicate or hooded, acute, sparsely hairy with long slender hairs, finely striate, base usually truncate or sometimes cuneate ; peduncles ¼–⅜ in. long. Upper cyme-branch 1–3-flowered. Petals blue, the 2 larger obovate, with a very long slender claw. Filaments very long, spirally coiled. Lateral cells of capsule either both empty or one or both containing an orange-brown seed ; dorsal cell of capsule ⅛ in. long, oblong, somewhat laterally compressed, rounded at both ends, slightly ribbed, containing 1 large seed which quite fills the cell. Seeds without appendages, orange-brown ; those of the lateral cells subglobose and irregularly angled when only one cell contains a seed, orbicular in outline, subdiscoid, compressed, when both cells are seed-bearing ; the seed of the dorsal capsule ⅛ in. long, oblong, rounded at both ends. Fl. B. I. v. 6, p. 371 ; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 168 ; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524.—Flowers : Nov.

Deccan : Poona, *Cooke* !, *Woodrow* !, *Jacquemont*, 360 !—Distrib. India (W. Peninsula) ; Tropical Africa.

Leafless suckers bear capsules that ripen underground as in *C. benghalensis*.

8. **Commelina clavata,** *Clarke, Comm. & Cyrt. Beng.* (1874) p. 15, t. 5. Stem 1–3 ft. long, sparingly branched ; branches diffuse, as thick as a crow-quill, rooting at the nodes. Leaves 1½–3 by ¼–¾ in., ovate or elliptic-lanceolate, or linear-lanceolate, acuminate, glabrous, puberulous or pubescent on one or both surfaces, narrowed at the base ; sheaths ½–1 in. long, narrowed into the blade, glabrous or pubescent, ribbed, sometimes speckled with brown, usually hirsute at the mouth. Spathes ¾–1¼ in. long, ovate-lanceolate, acuminate, glabrous or pubescent, base rounded or cordate ; peduncles ¾–1¾ in. long. Sepals spotted with small brown linear spots. Capsules when perfect ⅓ by ⅛ in., quadrate-oblong, truncately rounded at the ends, the tip bicuspidate, slightly constricted in the middle, with 4 seeds ; sometimes the 2 upper ovules alone produce seed, and the capsule is then constricted at the base, as if stalked. Seeds 4 (the two lower sometimes wanting), ⅛ in. long, cylindric, truncate at one end, rounded at the other, reticulately pitted. Fl. B. I. v. 6, p. 371 ; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 171, t. 2, fig. 2 ; Trim. Fl. Ceyl. v. 4, p. 301 ; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524.

Rare. Konkan : Matheran, *Woodrow*. S. M. Country : *Talbot* ! ; Badami, *Woodrow*. —Distrib. India (W. Peninsula) ; Ceylon, Java.

9. **Commelina attenuata,** *Koen. ex Vahl, Enum.* v. 2 (1806) p. 168. Stem 1–3 ft. long, slender, much-branched, glabrous or sparsely hairy. Leaves sessile, 1¼–3 by ⅛–½ in., linear or linear-lanceolate, acute or subobtuse; sheaths about ¼–⅜ in. long, ciliate, often scarcely distinct from the leaf-blade. Spathes 1–1½ in. long, narrowly ovate-lanceolate, acute or caudate-acuminate, glabrous, base deeply sagittately cordate, with large auricles; peduncles ⅜–1½ in. long, glabrous or pubescent. Flowers small, blue. Ovary 2-celled, the cells 2-ovulate. Capsules ¼ in. long, subquadrate-oblong, compressed, membranous, not constricted in the middle, 2-celled, the cells 1–2-seeded. Seeds when solitary large, ⅛ in. long; testa ash-colored or straw-colored with a white appendage at either end; when 2 seeds are superposed in a cell, the lower seed is much smaller. Fl. B. I. v. 6, p. 372; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 172; Trim. Fl. Ceyl. v. 4, p. 303; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1082. *Commelina rajmahalensis,* Clarke, in Journ. Linn. Soc. v. 11 (1870) p. 444, & Comm. & Cyrt. Beng. (1874) p. 17, t. 7.

I have seen no Bombay specimens, the specimen from Badami cited by Woodrow in his list having proved to be *C. clavata.*

10. **Commelina obliqua,** *Buch.-Ham. in Don, Prodr. Fl. Nep.* (1825) p. 45 (*not* of Vahl). Stem 2–3 ft. high, stout, branched, glabrous. Leaves 4–7 by 1–2 in., sessile or petiolate, lanceolate or elliptic-lanceolate, acute or caudate-acuminate, membranous, glabrous, scabrous or villous; sheaths reaching 1 in. long, the mouth bearded with long hairs. Spathes sessile or nearly so, ¾–1 in. long and as broad as long, solitary or crowded in terminal heads, acute, turbinately funnel-shaped, glabrous or subscabrid, usually filled with a clear glutinous liquid. Flowers blue, about ⅔ in. across, in simple (not branched) racemes; large petals clawed, orbicular. Ovary 3-celled, the cells 1-ovulate. Capsules ⅜ in. long, trigonous-obovoid, subequally 3-valved, 3-celled, 3-seeded. Seeds ¼ in. long, oblong or ellipsoid, smooth, puberulous, lead-colored. Fl. B. I. v. 6, p. 372; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 178; Trim. Fl. Ceyl. v. 4, p. 303; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1082; Watt, Dict. Econ. Prod. v. 2, p. 516. *Commelina polyspatha,* Wight, Icon. v. 6 (1853) p. 29, t. 2066.

KONKAN: *Stocks!, Law!*; Bassein, *Raoji!* DECCAN: Purandhar, *Woodrow.*—DISTRIB. Throughout India; Ceylon, Malay Islands.

11. **Commelina paleata,** *Hassk. in Miq. Pl. Jungh.* (1851–55) p. 139. Stem stout, branched, glabrous. Leaves 2–6 by 1–1¾ in., elliptic or broadly lanceolate, acuminate, glabrous or nearly so, base usually cuneate; sheaths ¾–1 in. long. Spathes ¾–1¼ in. long, shortly cucullate, ovate, acute or acuminate, with a broad rhomboid base, scabridly pubescent; peduncles ⅜–⅝ in. long. Flowers blue; lower cyme-branch 1–2-flowered, upper 4-flowered. Capsules ¼ in. long, quadrate-oblong, 3-celled, 3-valved. Seeds 3, subequal, ⅛ in. long, ellipsoid, rounded at both ends, dull black, nearly smooth, scarcely compressed. Fl. B. I. v. 6, p. 372; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 178; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524.

KONKAN: *Stocks!*; North and South Konkan, *Law!*—DISTRIB. India (W. Peninsula); Java.

12. **Commelina albescens,** *Hassk. in Schweinf. Beitr. Fl. Æthiop.* (1867) p. 210. Root-fibres thick; stems thickened at the base, often 2 or more from the root, clothed below with many white membranous sheaths, glabrous. Leaves 2–3 by $\frac{1}{4}$–$\frac{1}{2}$ in., linear or linear-lanceolate, acute, glabrous, the margins often undulate. Spathes $\frac{1}{2}$–$\frac{3}{4}$ in. long and sometimes nearly as broad as long, 1–3 together, subsessile, glabrous or nearly so, finely striate, cucullate, falcately hooked at one end, auricled at the other. Flowers blue, the lower raceme obsolete, the upper 3–5-flowered. Capsules $\frac{1}{8}$ in. long, 3-celled, 2-valved, the dorsal cell indehiscent, with muricate ribs. Seeds $\frac{1}{10}$–$\frac{1}{8}$ in. long, rounded at the ends and on the back, somewhat angular on the inner face, dull black. Fl. B. I. v. 6, p. 373; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 184; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524.

In the Bombay Presidency confined to Sind. SIND: *Dalzell*!, *Stocks*!, *Cooke*!, *Woodrow*.—DISTRIB. Beluchistan, Arabia, Tropical Africa.

I have not found that the seeds are spotted with yellow as noted by Mr. Clarke, though I have examined a considerable number.

DOUBTFUL AND INDETERMINABLE SPECIES.

COMMELINA AVENÆFOLIA, Grah. Cat. Pl. Bo. (1839) p. 224. Leaves sprinkled with hairs; sheaths hairy; involucre truncate. In the dense part of the jungle at Khandala (Deccan), *Graham*.

There are no data for the determination of this plant, of which the description is very meagre.

2. ANEILEMA, R. Br.

Simple or branched erect or decumbent herbs; roots usually fibrous (sometimes tuberous). Leaves usually alternate, sometimes all radical, occasionally clustered under the inflorescence, usually narrow and sessile (rarely broad and petiolate). Flowers in axillary and terminal panicles, bracteate and bracteolate; bracts not spathaceous. Sepals 3, membranous, free. Petals 3, obovate, equal. Stamens 2 or 3 with perfect anthers and 2–4 (rarely 0) reduced to staminodes with imperfect anthers; filaments slender, bearded or not. Ovary sessile, 2–3-celled; cells 1–many-ovulate; style slender, naked or bearded; stigma minute. Fruit a loculicidal capsule. Seeds 1 or more in each cell, with a thick hard rugose or pitted testa.—DISTRIB. Species about 60, tropical and subtropical, chiefly Asiatic.

Cells of the ovary 2-∞-ovulate; seeds 1-seriate in each cell.
- Cells of the ovary 3-∞-ovulate; cells of the capsule 1–3- or more-seeded. (See also *A. nudiflorum*.)
  - Flowers in panicles terminating an erect leafless scape with large sheathing bracts; leaves all radical ..... 1. *A. scapiflorum*.
  - Flowers in panicles terminating leafy stems.
    - Root of slender tubers; leaves reaching 12 in. long; filaments all bearded ..... 2. *A. herbaceum*.
    - Root fibrous; leaves less than 3 in. long; filaments of fertile stamens bearded, of the sterile usually naked.
      - A procumbent herb; stem less than 1 ft. long; filaments of sterile stamens sometimes bearded. 3. *A. spiratum*.
      - An erect herb 1 ft. high; filaments of sterile stamens never bearded ..... 4. *A. dimorphum*.

Flowers in axillary 1–3-flowered cymes.
Flowers blue; filaments all naked ..... 5. *A. pauciflorum.*
Flowers ochre-yellow; filaments all bearded ..... 6. *A. versicolor.*
Cells of the ovary 2-ovulate; cells of the capsule 2-seeded (sometimes 3-seeded in *A. nudiflorum* var. *compressa*).
Leaves 2–5 in. long; root fibrous ..... 7. *A. nudiflorum.*
Leaves reaching 12 in. or more long; root tuberous or fibrous.
Root tuberous; fertile stamens 2 with 3 staminodes and 1 rudimentary antherless stamen; filaments of the 3 staminodes naked ..... 8. *A. sinicum.*
Root fibrous; fertile stamens 3; staminodes 3; rudimentary stamen 0; filaments of all equal and bearded ..... 9. *A. giganteum.*
Cells of the ovary 4–20-ovulate; seeds 2-seriate in each cell.
Flowers axillary, solitary or clustered; pedicels jointed in the middle; flowers yellow.
Stem not exceeding 8 in. long; leaves less than 1 in. long; filaments naked ..... 10. *A. ochraceum.*
Stem reaching 16 in. long; leaves exceeding 1 in. long; filaments bearded ..... 11. *A. lanuginosum.*
Flowers in paniculate cymes, blue; leaves grass-like ..... 12. *A. paniculatum.*
Cells of the ovary 1-ovulate; cells of the capsule 1-seeded or empty ..... 13. *A. vaginatum.*

1. **Aneilema scapiflorum,** *Wight, Icon.* v. 6 (1853) p. 30, t. 2073. A tufted herb; root of elongate pisiform tubers. Leaves all radical, erect, 4–8 by $\frac{3}{8}$–$\frac{5}{8}$ in., narrowly ensiform, finely acuminate, glabrous or nearly so, slightly narrowed at the base. Flowers in erect elongate panicles on terminal leafless scapes; scape together with the panicle 8–18 in. long; sheaths on the scape below the panicle $\frac{3}{4}$–$2\frac{1}{4}$ in. long, embracing the scape, finely acuminate with an oblique mouth; upper bracts amplexicaul, ovate, acuminate or truncate, membranous, often spotted with small spots. Sepals $\frac{1}{4}$ in. long, elliptic-oblong, subacute, 3–5-nerved, purple-green. Petals blue, $\frac{3}{8}$ in. long, obovate, reticulately veined. Stamens 3 perfect and 3 staminodes; filaments all bearded with blue hairs; anthers of fertile stamens blue, those of the staminodes yellow. Capsules $\frac{1}{4}$ in. long, obovoid. Seeds 5 or 6 in a cell, superposed, $\frac{1}{16}$ in. in diam., sharply 3-gonous. Fl. B. I. v. 6, p. 375; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 200; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1083; Watt, Dict. Econ. Prod. v. 1, p. 252. *Aneilema tuberosum*, Buch.-Ham. in Wall. Cat. (1828) 5207; Dalz. & Gibs. p. 255.—Flowers; May–June.

Not common. S. M. Country: *Ritchie*, 748! Kanara: Kála naddi, *Ritchie*, 748!—Distrib. India (temperate and tropical Himalaya; Bhotan, Tirhut, W. Peninsula); Ceylon.

2. **Aneilema herbaceum,** *Wall. Cat.* (1828) 5223. Erect, robust, 3–4 ft. high, glabrous or nearly so; root of slender linear-oblong tubers; stem stout, round, smooth, leafy. Leaves sessile, the lower sometimes reaching 12 by 2 in., the cauline leaves 4–6 by $1\frac{1}{4}$–$1\frac{1}{2}$ in., all narrowly oblong or ensiform, acuminate, smooth with white undulate margins, base cuneate, rounded or cordate; sheaths entire. Flowers in stout glabrous dichotomously branched panicles, the branches distant and few-flowered; bracts small, soon falling. Sepals $\frac{1}{4}$ in. long, elliptic-oblong, concave, persistent on the fruit, marked with short brown lines, 3-nerved.

Petals blue, obovate or suborbicular. Stamens 3 (sometimes only 2) perfect; staminodes 3 or 4; filaments of all bearded. Capsules ellipsoid or subglobose, ¼ in. in diam., with a bluish tinge, smooth, glistening, mucronate. Seeds 3–4 (rarely 5) in each cell, 1-seriate, $\frac{1}{10}$ in. in diam., 3-gonous, reticulate, glandular-puberulous. Clarke, in DC. Monog. Phan. v. 3 (1881) p. 204; Jackson, Index Kewen. v. 1, p. 130. *Aneilema lineolatum*, Kunth, Enum. v. 4 (1843) p. 69; Clarke, Comm. & Cyrt. Beng. p. 27, t. 15; Hook. f. Fl. B. I. v. 6 (1892) p. 376; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524; Prain, Beng. Pl. p. 1084. *A. elatum*, Kunth, Enum. v. 4 (1843) p. 70; Dalz. in Kew Journ. Bot. v. 3 (1851) p. 137; Dalz. & Gibs. p. 254. *A. latifolium*, Wight, Icon. v. 6 (1853) p. 30, t. 2072.—Flowers: Aug.–Sept.

KONKAN: *Stocks*!, *Law*!; dark woods of the S. Konkan, *Dalzell & Gibson*; Wari country, *Dalzell*! S. M. COUNTRY: Rámghát, *Ritchie*, 1459!—DISTRIB. India (Sikkim, Bhotan, Khasia Hills, Birma, W. Peninsula); Malay Islands.

3. **Aneilema spiratum,** *R. Br. Prodr.* (1810) p. 271 (*in adnot.*). A dwarf annual, branched from the base; root fibrous; branches 6–10 in. long (often less), decumbent and rooting below, leafy. Leaves sessile, the lower broadly linear-lanceolate, the upper oblong, cordate, all amplexicaul, glabrous, ½–1½ by ⅓–½ in., acute, canaliculate in the middle; sheaths very short. Flowers about ⅓ in. across, in dichotomously branched, few-flowered panicles; peduncles terminal and from the upper axils, solitary or twin; pedicels rather long, longer than the fruit, bifarious, distant; bracts minute, ovate, amplexicaul, persistent. Sepals spreading. Petals blue, broadly oblong, obtuse. Stamens 3 perfect, the anthers apiculate, blue, the filaments bearded; staminodes 3, shorter than the stamens; the filaments usually naked but occasionally bearded. Ovary 3-celled; cells 3–many-ovulate. Capsules $\frac{1}{10}$–$\frac{1}{6}$ in. long, oblong, mucronate, smooth, shining, 3-gonous, the cells 3–7-seeded. Seeds 1-seriate, minute, angular or cubical, white or straw-colored. Fl. B. I. v. 6, p. 377; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 207; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1084. *Aneilema canaliculatum*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 137; Dalz. & Gibs. p. 254. *A. nanum*, Kunth, Enum. v. 4 (1843) p. 65; Wight, Icon. t. 2077 right-hand figure.—Flowers: Oct.

KONKAN: *Dalzell*!, *Stocks*!, *Law*!; Ratnagiri, *Woodrow*. DECCAN: Mahableshwar, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*!—DISTRIB. Throughout India; Ceylon, Malay Islands, China.

4. **Aneilema dimorphum,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 138. Whole plant glabrous (except the mouths of the sheaths), about 1 ft. high; root fibrous; stems many, branching from the root, the branches erect, terete, striate. Leaves 1–2½ by ⅓–½ in., linear-oblong to ovate-lanceolate, obtuse or acute, flat, base rounded or cordate; mouth of short sheath ciliate. Flowers ½ in. across, in panicles 1–1½ in. long, which are sparingly dichotomously branched, few-flowered; bracts small, $\frac{1}{20}$–$\frac{1}{12}$ in. long, ovate or orbicular, obtuse, cucullate, persistent. Sepals ovate, obtuse, concave, reflexed. Petals blue, obovate, subacute. Stamens 3 fertile and 3 staminodes; filaments of fertile stamens bearded, those of the staminodes naked. Ovary 3-celled; cells 3–5-ovulate. Capsules ⅛–¼ in. long, oblong, 3-gonous, shining. Seeds

3–5, uniseriate in each cell, $\frac{1}{12}$ in. in diam., subcubical, cupped at one end, brown-black, minutely striate. Fl. B. I. v. 6, p. 377; Dalz. & Gibs. p. 254; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 206; Trim. Fl. Ceyl. v. 4, p. 307; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 524. *Aneilema paniculatum*, Wight, Icon. v. 6 (1853) p. 31, t. 2075 (*not* of Wall.).

KONKAN: *Stocks*!, *Law*!, Malwán, *Dalzell*! KANARA: *Law*!—DISTRIB. India (W. Peninsula); Ceylon.

5. **Aneilema pauciflorum,** *Wight, Icon.* v. 6 (1853) p. 31, t. 2077 (*not* of Dalzell). A small decumbent plant creeping and rooting at the nodes; stem villous on one side. Leaves $\frac{1}{2}$–$1\frac{1}{4}$ by $\frac{3}{8}$–$\frac{5}{8}$ in., sessile, ovate, subacute, more or less hairy on both sides, base rounded or cordate; sheaths with ciliate margins. Flowers blue (?); pedicels axillary, solitary, or the upper 1–3-nate, $\frac{1}{4}$–$\frac{3}{8}$ in. long. Sepals narrowly oblong, thickened at the tips. Petals obovate. Stamens 3 fertile and 3 sterile, the filaments of the latter only half as long as those of the former; filaments of both stamens and staminodes naked. Capsules $\frac{1}{4}$ by $\frac{1}{10}$ in., oblong-fusiform, acute, somewhat 3-gonous, smooth, 3-celled. Seeds 4–6 in each cell, 1-seriate, superposed, cubical, nearly smooth, black. Fl. B. I. v. 6, p. 378; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 207; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525.

KONKAN: Matheran, *Woodrow*. DECCAN: Mahableshwar, *Woodrow*.—DISTRIB. India (W. Peninsula), apparently endemic.

There is but one sheet in Herb. Kew. (Wight's original example) from near Coimbatore in the Madras Presidency. Woodrow gives the plant for Matheran and Mahableshwar.

6. **Aneilema versicolor,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 136. A small herb with weak suberect branches; root fibrous; stems 4–8 in. long, many from the root, deeply striate, glabrous or hispid. Leaves alternate, bifarious, 1–2 by $\frac{3}{8}$–$\frac{1}{2}$ in., flat, oblong-lanceolate, acuminate, smooth, stem-clasping, 5–7-nerved; sheaths rather long, furrowed, more or less hispid. Flowers ochre-yellow, bluish when withering, rose-colored in bud (*Dalzell*); pedicels axillary, filiform, jointed about the middle, solitary or the upper 1–3-nate. Sepals oblong, obtuse, concave. Petals ochre-yellow. Stamens 3 fertile, spreading; filaments subulate, bearded in the lower part. Staminodes 3, shorter than the fertile stamens; filaments sparingly bearded. Capsules $\frac{1}{4}$ in. long, scarcely longer than the persistent sepals, linear, subtrigonous, pointed, erect; cells 5–7-seeded. Seeds cubical, about $\frac{1}{30}$ in. long. Fl. B. I. v. 6, p. 378; Dalz. & Gibs. p. 253; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 208; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525.

KONKAN: Malwán, *Dalzell & Gibson*. DECCAN: Mahableshwar, *Cooke*! S. M. COUNTRY: *Ritchie*, 749!—DISTRIB. India (W. Peninsula).

7. **Aneilema nudiflorum,** *R. Br. Prodr.* (1810) p. 271 (*in adnot.*). Root fibrous; stem subsimple or branched from the base; branches 6–12 in. long, weak, procumbent, often rooting at the nodes. Leaves 2–5 by $\frac{1}{4}$–$\frac{1}{2}$ in., linear-oblong or lanceolate, acute or acuminate, flat, glabrous, hairy or sparingly villous, base rounded, cordate, or narrowed into the sheath; sheaths hairy, the margins and mouth strongly ciliate. Flowers

in terminal (rarely axillary) panicles; branches of panicles long, scarred above; flowers in subglobose or subcorymbose cymes at the ends of the branches; pedicels $\frac{1}{8}$–$\frac{1}{6}$ in. long; bracts $\frac{1}{6}$ in. long, cymbiform, caducous. Sepals $\frac{1}{8}$ by $\frac{1}{20}$ in., oblong, obtuse. Petals suborbicular, blue or purple. Stamens 2 perfect, 2–4 sterile; filaments of the fertile only or of all bearded. Ovary 3-celled; cells 2-ovulate; style naked. Capsule $\frac{1}{6}$ in. long, 3-gonously subglobose, membranous, mucronate, smooth, 3-celled, with 2 seeds in each cell. Seeds $\frac{1}{16}$ in. long, truncate at one end, rounded at the other, angular on the inner, rounded on the outer face, tuberculate, dark brown. Fl. B. I. v. 6, p. 378; Dalz. & Gibs. p. 253; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 210; Trim. Fl. Ceyl. v. 4, p. 308; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1084. *Commelina nudiflora*, Linn. Mantiss. p. 177 (*not* of Sp. Pl.); Grah. Cat. p. 223.—Flowers: Sept.

Throughout the Presidency tolerably common. GUJARAT: Domas near Surat, *Cooke*!; Godra, *Cooke*!, *Woodrow*.—DISTRIB. Throughout India; Ceylon, China, Malay Islands.

VAR. *compressa*, Clarke, in DC. Monog. Phan. v. 3 (1881) p. 211. Leaves shorter, more fleshy; petals rose-colored; ovary often with 3 ovules in each cell; capsules often with 3 seeds in each cell. Fl. B. I. v. 6, p. 379. *Aneilema compressum* (sp.), Dalz. in Kew Journ. Bot. v. 3 (1851) p. 138; Dalz. & Gibs. p. 253.

KONKAN: Malwán, *Dalzell*!

8. **Aneilema sinicum,** *Lindl. Bot. Reg.* (1822) t. 659. Root of elongate tubers; stems 1–2 ft. high, suberect, glabrous, with long internodes. Leaves 6–12 by $\frac{1}{2}$–$\frac{2}{3}$ in., linear, acute, cauline and tufted at the base of the stem, glabrous or nearly so; sheaths long, ciliate. Flowers in terminal lax panicles; branches of the panicle closely scarred above; bracts $\frac{3}{8}$ in. long, ovate, acute, membranous, caducous; pedicels 0–$\frac{1}{4}$ in. long. Sepals ovate, acute, concave. Petals exceeding the sepals, obovate or suborbicular, blue. Stamens 2 fertile, twice as long as the staminodes, with bearded filaments; 1 rudimentary stamen consisting of a bearded filament with an acute antherless apex and 3 sterile stamens, the filaments of which are naked. Ovary with 2 ovules in each cell. Capsules subglobose, $\frac{1}{4}$ in. in diam., 3-celled, each cell 1–2-seeded. Seeds $\frac{1}{12}$ in. long, obscurely rugose. Fl. B. I. v. 6, p. 379; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 212; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525. *Aneilema secundum*, Wight, Icon. v. 6 (1853) p. 31, t. 2075.

KONKAN: *Stocks*! DECCAN: Mahableshwar, *Cooke*!; Wada, *Woodrow*.—DISTRIB. India (W. Peninsula); Africa, China, Malay Islands.

9. **Aneilema giganteum,** *R. Br. Prodr.* (1810) p. 271. Root fibrous, the fibres thick but scarcely tuberous; stem 1–3½ ft. high, erect, glabrous or nearly so, with long internodes. Leaves: the lowest 10–18, the upper 2–5 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, linear, finely acuminate, flat, striate, narrowed into a short or long sheath. Flowers $\frac{1}{2}$ in. across in terminal (rarely axillary) panicles; primary branches 3–4, umbellate, each again branched, the ultimate branches deeply, closely (almost pectinately) scarred; bracts at the axils of the branches of the panicle large, broadly ovate, cordate, acute; bracteoles $\frac{1}{6}$–$\frac{1}{4}$ in. long, orbicular,

concave, caducous; pedicels $\frac{1}{8}$–$\frac{1}{4}$ in. long. Sepals ovate-oblong, acute, concave. Petals pale purplish-blue, obovate or suborbicular. Stamens 3 perfect and 3 sterile; filaments of all equal and bearded. Ovary 3-celled; cells 2-ovulate; style naked. Capsules $\frac{3}{8}$ in. long, oblong-ellipsoid, mucronate, the cells 2-seeded; valves hard, polished. Seeds irregularly shaped, rough or echinulate, brown. Fl. B. I. v. 6, p. 379; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 212; Trim. Fl. Ceyl. v. 4, p. 308. *Aneilema ensifolium*, Wight, Icon. v. 6 (1853) p. 30, t. 2074.

KONKAN: *Stocks!*, *Law!* DECCAN: Mahableshwar, *Cooke!*—DISTRIB. India (Assam, Khasia Hills, W. Peninsula); Ceylon, Malay Islands, China, Australia, Africa.

10. **Aneilema ochraceum,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 135. Stem 4–8 in. long, rooting at the lower nodes, erect, simple, round, smooth, leafy. Leaves sessile, $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{4}$–$\frac{1}{2}$ in., flat, oblong or ovate-oblong, acute or subobtuse, glabrous or nearly so, base cordate, subamplexicaul. Pedicels fascicled, 2–7 from a leaf-axil, $\frac{1}{4}$–$\frac{3}{4}$ in. long, slender, minutely hispid, articulate about the middle. Sepals elliptic, obtuse, glabrous. Petals ochre-yellow, when withering blue, obovate. Stamens 3 fertile and 3 sterile; filaments of the fertile longer than those of the sterile ones, all naked. Capsules $\frac{1}{8}$–$\frac{1}{6}$ in. long, broadly oblong, obtuse, mucronate. Seeds 7–8 in each cell in 2 rows, straw-colored, angular, rugose. Fl. B. I. v. 6, p. 380; Dalz. & Gibs. p. 253; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 214, t. 4, fig. 3; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525. *Dichæspermum repens*, Wight, Icon. v. 6 (1853) p. 31, t. 2078, fig. 3 (*not* of Hassk.).

KONKAN: *Stocks!*, *Law!*, *Woodrow*; wet places in the S. Konkan, *Dalzell & Gibson.* KANARA: *Law!*, *Dalzell!*—DISTRIB. India (W. Peninsula).

11. **Aneilema lanuginosum,** *Wall. Cat.* (1828) 5221. Root of thickened fibres, almost tuberous; stem erect, pubescent, or villous, or nearly glabrous, 6–16 in. long, stout, branched. Leaves sessile, $1\frac{1}{2}$–$2\frac{1}{2}$ by $\frac{1}{4}$–$\frac{3}{8}$ in., linear or linear-lanceolate with a broad base, finely acuminate, pubescent on both sides, conspicuously striate and with undulate margins. Flowers from the upper leaf-sheaths, 1–5 from each sheath; pedicels $\frac{3}{4}$–2 in. long, erect in fruit, jointed in the middle and there furnished with a minute ovate scarious bracteole. Sepals $\frac{1}{4}$ by $\frac{1}{8}$ in., elliptic, obtuse, straw-colored. Petals $\frac{3}{8}$ in. long, broadly obovate or suborbicular, salmon-colored, turning blue in drying (*Gamble*). Filaments densely bearded. Capsules nearly $\frac{1}{8}$ in. long, oblong, trigonous, shining, long-cuspidate with the style. Seeds angular, smooth, sometimes slightly pitted. Fl. B. I. v. 6, p. 380; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 214; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525.—Flowers: Sept.–Oct.

KONKAN: *Stocks!*, *Law!* DECCAN: Mahableshwar, *Woodrow.* S. M. COUNTRY: Belgaum, *Ritchie*, 1474!—DISTRIB. India (W. Peninsula), apparently endemic.

12. **Aneilema paniculatum,** *Wall. Cat.* (1828) 5216. A small plant $2\frac{1}{2}$–8 in. high; root fibrous; stem sheathed at the base with yellowish scarious sheaths. Leaves 2–4 by $\frac{1}{20}$–$\frac{1}{10}$ in., linear, finely acuminate. Flowers in paniculate cymes; bracts ochreate, $\frac{1}{20}$–$\frac{1}{16}$ in. long, cyathiform, truncate, with a tooth at the apex, persistent; pedicels $\frac{1}{8}$–$\frac{3}{8}$ in. long, filiform, red (*Dalzell*). Sepals $\frac{1}{10}$–$\frac{1}{8}$ by $\frac{1}{16}$ in., elliptic, obtuse, glabrous. Petals $\frac{1}{8}$–$\frac{1}{6}$ in. long, obovate, cuneate, veined,

blue. Stamens 3 fertile and 3 sterile; filaments all connate at the very base, naked. Ovary ovoid; style $\frac{1}{16}$ in. long. Capsules $\frac{1}{10}$–$\frac{1}{8}$ in. long, ellipsoid or subglobose, smooth, shining. Seeds 6–8 in each cell, pale yellow, 2-seriate, irregularly angular, smooth. Fl. B. I. v. 6, p. 381; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 215; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525. *Aneilema semiteres*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 138; Dalz. & Gibs. p. 254. *Dichæspermum juncoides*, Wight, Icon. v. 6 (1853) p. 31, t. 2078. *Commelina Nimmoniana*, Grah. Cat. Pl. Bo. (1839) p. 224.—Flowers: Aug.

KONKAN: *Dalzell*!, *Law*!; Mâlabar Hill (Bombay), *Graham*; Narel below Matheran, *Kanitkar*! DECCAN: Mâwal near Poona, *Woodrow*; between Poona and Karli, *Jacquemont*, 561! KANARA: Karwar, *Woodrow*.—DISTRIB. India (W. Peninsula) in rocky places.

13. **Aneilema vaginatum,** *R. Br. Prod.* (1810) p. 271 (*in adnot.*). Root fibrous, the fibres stout, almost fleshy; stem 6–18 in. long, very slender, flaccid, rooting at the lower nodes; branches suberect, ending in filiform peduncles with distant flowering bracts. Leaves 3–8 by $\frac{1}{4}$–$\frac{3}{8}$ in., linear, acuminate, flat, glabrous or sparsely hairy; sheaths short, open, ciliate. Flowers small, 1–3 together, fascicled in distant bracts, along the filiform very slender terminations of the branches; bracts $\frac{1}{3}$–$\frac{1}{2}$ in. long, narrowly oblong, obtuse, sheathing, strongly ribbed; pedicels $\frac{1}{2}$–$\frac{3}{4}$ in. long, very slender, puberulous, usually twice-jointed. Sepals $\frac{1}{6}$ in. long, ovate-oblong, obtuse, glabrous or pubescent. Petals orbicular, blue. Stamens 2 perfect, 3–4 sterile; filaments of the perfect stamens bearded, those of the sterile ones usually naked, shorter than the fertile filaments. Ovary 2-celled; cells 1-ovulate. Capsules $\frac{1}{8}$ in. in diam., globose, cuspidate, shining, 3-celled; cells 1-seeded or empty. Seeds 3-gonously conic, one end abruptly truncate, the other narrowed, obtuse, slightly rugose, black. Fl. B. I. v. 6, p. 381; Wight, Icon. t. 2076; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 216; Trim. Fl. Ceyl. v. 4, p. 309; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1084. *Aneilema pauciflorum*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 136; Dalz. & Gibs. p. 253.—Flowers: Aug.

A very distinct species. The panicle is reduced to a long filiform rhachis with very distant bracteate clusters of flowers.

KONKAN: *Dalzell*!, *Stocks*!, *Law*!; Matheran, *Woodrow*. KANARA: *Law*!—DISTRIB. Throughout tropical India in rice-fields and wet places; Ceylon, China.

EXCLUDED SPECIES.

ANEILEMA KOENIGII, Wall. Cat. (1828) 5214. This does not appear to be a Bombay plant. Woodrow includes it in his list of plants without locality. According to the 'Flora of British India' it occurs in S. India to the south of the Konkan and Kanara. I have seen no specimens from Bombay; there are none in Herb. Kew., and the plant does not seem to have been found by any Bombay botanists.

3. CYANOTIS, Don.

Herbs prostrate or creeping. Leaves small. Flowers in axillary and terminal scorpioid cymes, formed of large imbricate, 2-seriate, secund, foliaceous, falcate bracteoles, the petals and stamens alone exserted (rarely the corolla-tube also exserted); sometimes the flowers in exposed

racemes or fascicled in the ochreate leaf-sheath. Sepals 3, subequal, free or connate below. Petals 3, subequal, often united into a tube below; the limb orbicular. Stamens 6, all perfect, subequal, hypogynous or epipetalous; filaments usually bearded, often inflated towards the apex; anthers oblong. Ovary 3-celled; ovules 2 in each cell, collateral, one erect, the other pendulous. Fruit a 3-celled loculicidal capsule. Seeds usually 2 in each cell, superposed, cubical or pyramidal, usually rugose.—DISTRIB. Species 35, in the warm regions of the Old World, Africa, India, Malaya, Ceylon, S. China, Tropical Australia.

Cymes enclosed in 2-seriate falcate imbricating bracteoles; valves of the capsule separating from a free central columnar 3-toothed axis ..... 1. *C. papilionacea.*
Capsule with no free central column after dehiscence.
Root of fusiform narrow tubers; a large coarse species. 2. *C. tuberosa.*
Root fibrous.
A floccosely silky or cobwebby woolly herb; filaments bearded with hairs of 2 colors; leaves ¾–2 in. long; seeds oblong, faintly rugose ..... 3. *C. fasciculata.*
Not floccosely silky nor cobwebby; filaments bearded with hairs of one color.
Leaves 1¼–2½ in. long, ovate-oblong with rounded or cordate bases; seeds 3-gonous, striate, with 2 large pits on 2 of the faces ..... 4. *C. cristata.*
Leaves 6–18 in. long, narrowed from the base to the tip; seeds truncate at the base, slightly tapering upwards, with shortly conical apex... 5. *C. Wightii.*
Bracteoles small, not imbricating in 2 series.
Epiphytic viviparous herb; flowers in small umbels terminating short lateral peduncles from a long scape..... 6. *C. vivipara.*
Terrestrial not viviparous herb; flowers axillary, enclosed in the sheaths of the leaves ..... 7. *C. axillaris.*

1. **Cyanotis papilionacea,** *Schultes f. Syst.* v. 7 (1830) p. 1151. A hispid annual 4–8 in. high, sparingly branched from near the base, the branches decumbent, often rooting; stem red, terete, striate, patently pilose. Leaves sessile, linear-oblong or lanceolate, 1–2 by ¼–½ in., acute, acuminate, or obtuse and apiculate, more or less hairy above, patently hairy beneath, the upper leaves longer than the lower; sheaths very short. Peduncles slender, ½–2 in. long, patently hairy; bract ovate-lanceolate, falcately recurved, often longer than the spike; bracteoles ⅓ in. long, 2-seriate, ovate, falcate, acute, ciliate. Sepals lanceolate, acute, ciliate. Corolla-tube whitish, longer than the lobes; lobes bluish-purple, rounded. Stamens much exserted, twice as long as the corolla, equalling the style; anthers violet; filaments slightly thickened at the tip, bearded above with blue hairs. Ovary hairy; style naked. Capsules included, oblong, ¾ by ⅝ in., hairy towards the apex; valves separating from a free central columnar 3-toothed axis. Seeds smooth or pitted, 2 in each cell. Fl. B. I. v. 6, p. 384; Wight, Icon. t. 2089; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 246; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525. *Cyanotis hispida,* Dalz. in Kew Journ. Bot. v. 3 (1851) p. 139; Dalz. & Gibs. p. 255. *Tradescantia rupestris,* Law, in Grah. Cat. Pl. Bo. (1839) p. 223.—Flowers: Aug.–Sept.

KONKAN: *Dalzell!, Woodrow*; S. Konkan on rocks, *Dalzell & Gibson*; Malwán, *Dalzell!* KANARA: *Law!*—DISTRIB. India (W. Peninsula).

2. **Cyanotis tuberosa,** *Schultes f. Syst.* v. 7 (1830) p. 1153. Root of fusiform tubers; stem 6–36 in. long, swollen and very hirsute at the very base, suberect or prostrate and creeping below, densely villous or almost glabrous. Leaves sessile, the radical and lower cauline 6–10 by $\frac{1}{3}$–1 in., often purple beneath, linear or ensiform, villous, the upper cauline leaves much shorter; sheaths of radical leaves 1 in. long, glabrous, those of the cauline leaves shortly silky. Cymes villous or densely hirsute, $\frac{1}{2}$–1 in. long, usually pedunculate, in the axils of short ovate acute leaves (bracts) which are shorter than the cyme, strongly falcately decurved; bracteoles imbricate in 2 series, usually many, $\frac{1}{3}$–$\frac{2}{3}$ in. long. Sepals $\frac{1}{4}$ by $\frac{1}{16}$ in., linear-lanceolate, acute, densely villous and ciliate. Corolla $\frac{1}{3}$ in. long, bluish-purple; lobes $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate, subacute. Filaments spirally twisted, fusiform towards the tips, densely bearded above with blue hairs; anthers $\frac{1}{20}$ in. long, yellow. Style thickened at the tip, with a tuft of hairs near the apex. Capsules $\frac{1}{6}$ by $\frac{1}{10}$ in., ellipsoid, the upper half hairy, the lower half glabrous. Seeds $\frac{1}{16}$ in. long and broad, truncate at the base, shortly conic at the apex, obscurely rugose, brown. Fl. B. I. v. 6, p. 386; Dalz. & Gibs. p. 256; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 249; Trim. Fl. Ceyl. v. 4, p. 312; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Watt, Dict. Econ. Prod. v. 2, p. 674. *Tradescantia tuberosa*, Roxb. Cor. Pl. v. 2 (1798) p. 5, t. 108; Grah. Cat. p. 223.—Flowers: Aug.–Sept.

KONKAN: *Stocks!*, *Law!*; N. & S. Konkan, *Law!* DECCAN: Purandhar, *Bhiva!* S. M. COUNTRY: Belgaum, *Stocks!* *Ritchie*, $\frac{743}{2}$!; Dharwar, *Woodrow*; Badami, *Woodrow.* KANARA: *Law!*; Kála naddi, *Ritchie*, 743!—DISTRIB. India (W. Peninsula); Ceylon.

VAR. *ascendens*, C. B. Clarke, in DC. Monog. Phan. v. 3 (1881) p. 249. A smaller plant, more glabrous; branches ascending or procumbent, rooting and proliferous at the nodes; flowers blue. Fl. B. I. v. 6, p. 386; Prain, Beng. Pl. p. 1085. *Cyanotis ascendens* (sp.), Dalz. in Kew Journ. Bot. v. 4 (1852) p. 343; Dalz. & Gibs. p. 255. *C. sarmentosa*, Wight, Icon. v. 6 (1853) p. 33, t. 2087.

KONKAN: *Stocks!*, *Law!* DECCAN: hills near Chattersinghi (Poona districts), *Cooke!*; Bowdhan, near Poona, *Ranade!* S. M. COUNTRY: Belgaum, *Dalzell!*, *Stocks!*, *Ritchie*, 1466!; Badami, *Woodrow.*

3. **Cyanotis fasciculata,** *Schultes f. Syst.* v. 7 (1830) p. 1152. A small branched floccosely silky or cobwebby woolly herb; root annual, fibrous; branches 4–10 in. long, spreading, slightly rooting below, leafy. Leaves $\frac{3}{4}$–2 by $\frac{1}{8}$–$\frac{3}{8}$ in., sessile, linear-lanceolate or narrowed from the base to the tip, acute or acuminate, straight or recurved, cobwebby on both sides (rarely glabrate). Cymes $\frac{1}{4}$–$\frac{2}{3}$ in. long, axillary and terminal; peduncles $\frac{1}{2}$–1 in. long, 1 or more together; bracts lanceolate, $\frac{3}{8}$–$\frac{1}{2}$ in. long, usually falcately recurved, acute, longer than (rarely shorter than or equalling) the cobwebby cyme; bracteoles $\frac{1}{4}$–$\frac{1}{3}$ in. long, lanceolate or ovate-lanceolate, falcate, acuminate. Sepals $\frac{1}{6}$ by $\frac{1}{12}$ in., elliptic-lanceolate, acute, cobwebby. Corolla $\frac{1}{4}$ in. long, pink; lobes $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate, obtuse or subacute. Filaments filiform, spirally twisted, bearded with hairs of 2 colors, blue and white (*Dalzell*). Ovary with an erect tuft of hairs at the apex; style naked, fusiform at the tip. Capsules $\frac{1}{6}$ by $\frac{1}{12}$ in., oblong, 3-gonous, pilose at the apex. Seeds oblong, faintly rugose. Fl. B. I. v. 6, p. 387; Dalz. & Gibs. p. 255; Wight,

Icon. t. 2086; Trim. Fl. Ceyl. v. 4, p. 314; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525. *Cyanotis dichrotricha*, Stocks, in Wight, Icon. v. 6 (1853) p. 33, t. 2087.

In the 'Flora of British India,' p. 388, *Tradescantia rupestris* (Law, in Grah. Cat. p. 223) is given as a synonym for this plant, but it has also been given as a synonym for *C. papilionacea* in p. 385, which is the synonymy adopted by Dalzell (Bo. Fl. p. 255), and is, I think, correct.

KONKAN: *Stocks*!, *Law*! DECCAN: common, *Woodrow*; Poona districts, *Cooke*!; Panchgani, *Cooke*!, *Bhiva*!—DISTRIB. India (W. Peninsula); Ceylon.

VAR. *glabrescens*, C. B. Clarke, in DC. Monog. Phan. v. 3 (1881) p. 253. Leaves linear, glabrous, very minutely reticulate on both sides; bracts glabrous; bracteoles woolly. Fl. B. I. v. 6, p. 388.

DECCAN: Panchgani, *Cooke*! S. M. COUNTRY: Belgaum, *Ritchie*, 746!

4. **Cyanotis cristata,** *Schultes f. Syst.* v. 7 (1830) p. 1150. Root fibrous, the fibres very slender; stem branched from the base, the branches 6–18 in. long, slender, creeping and rooting below, then ascending, glabrous or with spreading hairs; internodes 1–3 in. long. Leaves $1\frac{1}{4}$–$2\frac{1}{4}$ by $\frac{1}{2}$–$\frac{3}{4}$ in., sessile, spreading, ovate-oblong, obtuse or subacute, flat, glabrous or sparsely hairy, with villously ciliate margins, base rounded or cordate; sheaths short, hirsute. Flowers in scorpioidly recurved cymes $\frac{1}{2}$–1 in. long, longer than the bracteoles; peduncles $\frac{1}{2}$–4 in. long, sometimes almost 0; bracts like the leaves, $\frac{2}{3}$–$1\frac{1}{2}$ in. long, ovate, cordate, acuminate, ciliate; bracteoles $\frac{1}{2}$ by $\frac{1}{5}$ in., few or many, 2-seriate, ovate, falcate, acute, glabrous, or ciliate with long hairs. Sepals lanceolate, acuminate. Corolla-tube not much exceeding the sepals; corolla-lobes ovate. Filaments fusiform below the tip, bearded above. Style naked. Capsules $\frac{1}{10}$–$\frac{1}{8}$ in. long, oblong, 3-gonous, truncate, membranous, nearly glabrous. Seeds $\frac{1}{20}$ in. long, 3-gonous, striate and with 2 large pits on two of the faces, black. Fl. B. I. v. 6, p. 385; Dalz. & Gibs. p. 256; Wight, Icon. t. 2082; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 247; Trim. Fl. Ceyl. v. 4, p. 311; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1085. *Tradescantia cristata*, Jacq. Hort. Vind. v. 2 (1772) p. 64, t. 137; Grah. Cat. p. 223.—Flowers: Aug.–Oct.

A very common species during the rains. KONKAN: *Stocks*!; Parel (Bombay), *Woodrow*!; Bassein, *Raoji*! DECCAN: Mahableshwar, *Cooke*!, *Woodrow*!; Wassind, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 742!—DISTRIB. Throughout Tropical India; Ceylon, Malay Islands, Mauritius, Tropical Africa.

5. **Cyanotis Wightii,** *C. B. Clarke, in DC. Monog. Phan.* v. 3 (1881) p. 250. A tall plant, 2–3 ft. high; root fibrous, woody, not tuberous; stems many, elongate, branched, usually softly villous. Leaves 6–18 by $\frac{1}{2}$–$1\frac{1}{2}$ in., narrowly lanceolate, more or less sparsely hairy, with villously ciliate margins, narrowed from the base to the tip; sheaths loose, $\frac{1}{2}$–$\frac{7}{8}$ in. long, pilose. Cymes axillary and terminal, subcorymbose; peduncles variable in length, usually several together from a large linear-lanceolate, falcately-deflexed leaf; bracts below the cymes ovate-lanceolate, foliaceous, usually longer than the cyme but occasionally shorter; bracteoles falcately ovate, acuminate, $\frac{1}{2}$–$\frac{3}{4}$ in. long, ciliate, Sepals $\frac{1}{4}$ in. long, lanceolate, acute, hairy. Corolla blue; lobes shorter than the tube, ovate or suborbicular. Filaments bearded above. Ovary

obovoid, hirsute at the top; style naked, thickened at the tip. Capsules $\frac{1}{8}$ by $\frac{1}{12}$ in., obovoid, obtuse, hirsute at the apex, splitting to the base. Seeds $\frac{1}{16}$ in. long, truncate at the base, slightly tapering upwards with a shortly conical apex. Fl.-B. I. v. 6, p. 386; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525. *Cyanotis longifolia*, Wight, Icon. v. 6 (1853) p. 33, t. 2084 (*not* of Benth.).—Flowers: Aug.-Sept.

DECCAN: Mahableshwar, *Cooke!*, *Woodrow*; Panchgani, *Woodrow.*—DISTRIB. India (W. Peninsula).

6. **Cyanotis vivipara,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 226. Epiphytic, stemless, subscapigerous, clothed with scattered rufous spreading hairs; rootstock small, with tufts of pilose, radical, sessile, linear, acute leaves, 2–5 by $\frac{1}{4}$–$\frac{3}{8}$ in., clothed and ciliate with rufous hairs. Scapes many from the root, very slender (almost filiform), rooting below, viviparous at the apex, with several small oblong-lanceolate acute leaves $\frac{1}{4}$–$\frac{1}{2}$ in. long, from the axils of which short, slender, hairy peduncles issue, each bearing an umbel of 2–4 shortly pedicellate flowers, with 2 small oblong acute bracts beneath each umbel. Sepals $\frac{1}{8}$ in. long, narrowly oblong, villous. Petals white, connate to the middle. Filaments not bearded (*Clarke*). Style naked. Capsules $\frac{1}{8}$ by $\frac{1}{20}$ in., oblong, obtuse, rufous-hairy, the valves much recurved after dehiscence. Seeds cylindric, smooth. Fl. B. I. v. 6, p. 388; Dalz. & Gibs. p. 255; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 244, t. 5, fig. 5; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525.—Flowers: Aug.-Sept.

KONKAN: *Woodrow*; N. & S. Konkan, *Law!*; Sahyadri Hills, *Dalzell!* S. M. COUNTRY: Párva Ghát, *Dalzell!*—DISTRIB. India (W. Peninsula).

7. **Cyanotis axillaris,** *Schultes f. Syst.* v. 7 (1830) p. 1154. Root fibrous; stem annual, 6–18 in. long, stout or slender, diffusely branched, leafy, glabrous; branches suberect and creeping below, or prostrate, glabrous or sparsely hairy, often colored; internodes 1–3 in. long. Leaves sessile, 2–6 by $\frac{1}{6}$–$\frac{1}{3}$ in., narrowly linear or linear-lanceolate, acute or acuminate, flat, glabrous or more or less hairy; sheaths $\frac{1}{4}$–$\frac{3}{8}$ in. long, inflated, ciliate. Flowers violet-blue, clustered in the inflated sheaths, the cymes reduced to axillary fascicles of flowers with the small linear or linear-lanceolate bracteoles almost concealed in the leaf-sheaths. Sepals $\frac{3}{8}$ in. long, spathulate-lanceolate, acuminate, sparsely hairy. Corolla-tube $\frac{1}{3}$ in. long; corolla-lobes broadly ovate, subacute. Filaments fusiform below the tip, bearded. Style fusiform at the apex, naked. Capsules rather more than $\frac{1}{4}$ in. long, oblong-ellipsoid, beaked, shortly stipitate, quite glabrous except the beak. Seeds $\frac{1}{10}$ in. long, oblong, compressed, truncate at the base, rounded at the apex with a very short conical tip, beautifully mottled, dark brown, shining. Fl. B. I. v. 6, p. 388; Dalz. & Gibs. p. 256; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 244; Trim. Fl. Ceyl. v. 4, p. 315; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1085; Watt, Dict. Econ. Prod. v. 2, p. 674. *Tradescantia axillaris*, Linn. Mantiss. (1771) p. 321; Roxb. Cor. Pl. v. 2 (1798) p. 5, t. 107; Grah. Cat. p. 223.—Flowers: Aug.-Sept.

DECCAN: common in the W. Deccan, *Dalzell & Gibson*; Poona, *Cooke!*, *Woodrow.* S. M. COUNTRY: Karlimatti, *Woodrow!* GUJARAT: Baroda, *Woodrow.*—DISTRIB. Throughout India; Ceylon, East Asia, Tropical Australia.

4. **FLOSCOPA,** Lour.

Erect or subscandent herbs. Leaves lanceolate. Flowers in terminal or axillary panicles of secund but not scorpioid cymes; bracts minute. Sepals 3, oblong, free. Petals 3, obovate, free. Stamens 6, all perfect, or 1 imperfect, hypogynous; filaments filiform, glabrous. Ovary 2-celled; ovules solitary in each cell. Fruit a compressed or didymous loculicidal 2-celled capsule. Seed solitary in each cell, hemispheric.—DISTRIB. Species about 11, tropical.

1. **Floscopa scandens,** *Lour. Fl. Cochinch.* (1790) p. 193. Root fibrous; stem rather slender, rooting below; internodes long; branches ascending, leafy above, glabrous or pubescent. Leaves 2–4 by $\frac{1}{2}$–1 in., elliptic-lanceolate, acuminate, much narrowed at the base, subsessile or shortly petiolate, scaberulous above, glabrous or pubescent beneath; sheaths loose, short, glabrous or villous, the mouth fringed with long hairs. Flowers in terminal, sessile or shortly pedunculate villous or hirsute panicles, the flowers racemosely arranged along the long erect or ascending many-flowered branches of the panicle, pedicellate, small, subglobose, the lower flowers bracteate, the upper ebracteate; bracteoles minute. Sepals $\frac{1}{10}$–$\frac{1}{8}$ in. long, rotund-ellipsoid, concave, villous. Petals slightly longer than the sepals, broadly obovate, white, lilac or pink. Filaments longer than the petals, equal, purplish; anthers golden-yellow. Ovary glabrous. Capsules rather broader than long, $\frac{1}{10}$–$\frac{1}{6}$ in. in diam., suborbicular, abruptly subacute at both ends, shining. Seeds $\frac{1}{16}$ in. long, pale glaucous, dorsally transversely wrinkled. Fl. B. I. v. 6, p. 390; Clarke, in DC. Monog. Phan. v. 3 (1881) p. 265; Trim. Fl. Ceyl. v. 4, p. 316; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1086. *Dithyrocarpus paniculatus,* Kunth, Enum. v. 4 (1843) p. 79; Dalz. & Gibs. p. 256. *Dithyrocarpus petiolatus, D. Rothii* and *D. undulatus,* Wight, Icon. v. 6 (1853) p. 32, tt. 2079, 2080.—Flowers: Oct.–Nov.

KONKAN: on the Ghâts, *Dalzell & Gibson.* S. M. COUNTRY: Londa, *Cooke!* Castlerock, *Woodrow.* KANARA: *Woodrow*; Jagalbet, *Ritchie,* 747!; Kâla naddi, *Ritchie,* 747!—DISTRIB. Throughout Tropical India in swampy places; Ceylon, East Asia, Tropical Australia.

The following plants of the Order are commonly grown in gardens:—

Rhoeo discolor, Hance, in Walp. Ann. v. 3 (1853) p. 659. Leaves large, upright, much imbricated, narrowly lanceolate, acute, sheathed at the base, green above and purple beneath. Flowers blue or purple, almost included within the bracts. A native of Central America. When grown in a rich soil and regularly watered it is a striking plant easily propagated by cuttings. Common in gardens and in pots about bungalows, usually known as Tradescantia. *Tradescantia discolor,* L'Hérit. Sert. Angl. (1788) p. 8, t. 12; Grah. Cat. p. 223; Dalz. & Gibs. Suppl. p. 94; Woodr. Gard. in Ind. ed. 5, p. 517.

Zebrina pendula, Schnizl. in Bot. Zeit. v. 7 (1849) p. 870. A decumbent herb of creeping habit. It has green leaves 1$\frac{3}{4}$ by $\frac{3}{4}$ in., striped (Zebra-like) with white above and purple beneath. It forms a good basket plant and is also useful for covering the earth in large pots or

tubs, or as an edging. It is a native of Mexico, and is easily propagated by cuttings. *Tradescantia zebrina*, Hort. ex Loud. Encyc. Pl. v. 2 (1855) Suppl. 2, p. 1340; Dalz. & Gibs. Suppl. p. 94; Woodr. Gard. in Ind. ed. 5, p. 517.

Order CXXXVI. FLAGELLARIACEÆ.

Shrubs with long, usually climbing leafy stems. Leaves many-nerved, usually long, with sheathing bases. Flowers small, regular, hermaphrodite or diœcious, in terminal panicles; bracts often lanceolate; bracteoles minute or 0. Perianth inferior, persistent; segments 6, free, small, imbricate, sub-2-seriate, dry or subpetaloid. Stamens 6, hypogynous; filaments free, filiform; anthers ovate or oblong, basifixed, 2-celled. Ovary superior, 3-celled; ovule solitary in each cell, anatropous, adnate to the axis; style short with 3 stigmatic arms, or styles 3 distinct. Fruit a small berry or a drupe with 1–3 pyrenes. Seeds laterally attached; testa membranous or thick; albumen floury; embryo lenticular.—Distrib. Genera 3; species 7–8, of the Old World and Pacific.

1. FLAGELLARIA, Linn.

A climbing shrub with long slender stems. Leaves many, lanceolate, with tendril-like tips; nerves many, parallel. Flowers many, small, hermaphrodite, fascicled or spicate along the branches of a terminal panicle; bracts small, scale-like. Perianth subpetaloid; segments 6, ovate, obtuse. Stamens 6, hypogynous. Ovary 3-celled; ovule solitary, affixed laterally; style divided nearly to the base into 3 subentire or 2-partite stigmatic arms. Fruit a small globose or ovoid drupe, with a thin succulent exocarp and a bony 1–2-seeded endocarp. Seed globose or ovoid; testa appressed, membranous.—Distrib. Species 1 Fijian and the following:—

1. **Flagellaria indica,** *Linn. Sp. Pl.* (1753) p. 333. A reed-like climber, quite glabrous, climbing over lofty trees by the leaf-tendrils; stem nearly 1 in. thick towards the base, terete, smooth; branches clothed with cylindric smooth, striate, closed, truncate sheaths; branchlets as thick as a crow-quill. Leaves sessile, 6–10 in. long, variable in breadth, lanceolate from a rounded base, shortly narrowed into the sheath, drawn out at the apex into a slender spiral tendril, many-nerved; sheaths cylindric, striate, 2-auricled at the apex. Flowers white, in shortly pedunculate irregularly laxly branched panicles 6–12 in. long. Outer perianth-segments $\frac{1}{10}$ in. long, broadly ovate or suborbicular, obtuse; inner segments similar, more or less unequal. Anthers $\frac{1}{12}$ in. long, deeply 2-fid at the base. Ovary to top of stigma $\frac{1}{10}$ in. long; style-arms about $\frac{1}{20}$ in. long. Drupe pisiform, red, smooth. Fl. B. I. v. 6, p. 391; Grah. Cat. p. 230; Dalz. & Gibs. p. 256; Trim. Fl. Ceyl. v. 4, p. 317; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1087.

Konkan: *Stocks*!; S. Konkan, *Dalzell*; among rocks near the sea, *Dalzell & Gibson.*—Distrib. Throughout India, chiefly near the coast; Ceylon, Tropical Asia and Africa.

Order CXXXVII. JUNCACEÆ.

Erect usually perennial herbs; stems tufted or with a creeping rootstock. Leaves flat, terete, or reduced to sheaths. Flowers usually small, hermaphrodite, regular, in axillary or terminal cymes, green or whitish and membranous, or brown and coriaceous; bracts small. Perianth inferior, persistent; segments or lobes 6, more or less 2-seriate, free or connate below in a very short tube, persistent, imbricate. Stamens usually 6, adnate to the base of the perianth-lobes or hypogynous, occasionally the 3 of the inner series absent; filaments filiform; anthers basifixed. Ovary superior, 3-celled or 1-celled; ovules 3 basilar in 1-celled ovaries, numerous on the inner angles of the cells in 3-celled ovaries, anatropous. Fruit a capsule 1–3-celled, loculicidally 3-valved. Seeds erect; testa membranous, often produced at each end; albumen dense; embryo small, near the hilum.—Distrib. Genera 14; species about 200.

1. JUNCUS, Linn.

Perennial (rarely annual) glabrous herbs; stems simple under the inflorescence. Leaves radical, or few near the base of the stem, linear, or terete, or reduced to sheaths. Flowers small, usually clustered in fascicles or 2-fid cymules, either sessile capitate, or unequally pedunculate paniculate, the whole inflorescence terminal or subterminal on the scape-like stems, with 1–3 leafy bracts. Perianth with 6 glume-like segments, free, lanceolate or oblong, often with scarious margins, the 3 outer keeled or with a thickened midrib. Stamens 6 (rarely 3), hypogynous or nearly so; anthers oblong or linear, erect; dehiscence longitudinal, introrse. Ovary 1-celled or imperfectly or perfectly 3-celled; ovules many on each placenta; style filiform; stigmatic arms 3, filiform, often spirally twisted. Fruit a capsule, dehiscing by 3 valves with mesial placentas, or rarely by 3 valves leaving the placentas persistent or connate in a central column. Seeds small, ovoid; testa striate, reticulate, or transversely lineate; embryo small, near the base of the fleshy albumen.—Distrib. Species about 150, temperate and arctic, rarely tropical.

2–5 ft. high; leaves solid, few; seeds shortly tailed at each end; floral bracts ovate, mucronate, with membranous margins; anthers longer than the filaments ..... 1. *J. maritimus.*
2 ft. high; leaves with a central hollow; seeds not tailed; floral bracts hyaline, acuminate; anthers shorter than the filaments ..... 2. *J. punctorius.*

1. **Juncus maritimus,** *Lamk. Encyc. Méthod.* v. 3 (1789) p. 264. Perennial, densely cæspitose; stems 2–5 ft. high, erect, terete, striate; pith solid; basal sheaths short, narrow, obtuse, pungent, or produced into a solid terete pungent leaf. Flowers in decompound cymes 1–2 in. long, with erect branches; floral bracts ovate, mucronate, the margins broadly membranous. Sepals $\frac{1}{8}$–$\frac{1}{6}$ in. long, pale-green, with membranous margins, lanceolate, acute. Petals slightly shorter, obtuse. Stamens 6; filaments dilated and connate at the base; anthers linear, yellow, longer than the filaments. Capsules longer than the sepals, ovoid or conic, 3-gonous, obtuse, mucromate, shining, 3-celled. Seeds oblong or obovoid, caudate at each end. Fl. B. I. v. 6, p. 393; Buchen. Monog.

Junc. in Engl. Bot. Jahrb. v. 12 (1890) p. 256; Boiss. Fl. Orient. v. 5, p. 354; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525.—Flowers: Oct.

SIND: *Woodrow*; sandy shores of Sind, *Stocks*, *Dalzell*, 1!—DISTRIB. Afghanistan and westward to the Atlantic, N. and S. America, Australia.

2. **Juncus punctorius,** *Linn. f. Suppl.* (1781) p. 208. Tall, stout, perennial, pale-green, 2 ft. high; stems soft, often as thick as a goose-quill, terete, smooth. Leaves as long as the stem and nearly as stout, acuminate, irregularly septate, cylindric or compressed, multitubular with a central hollow. Flowers brownish-red in erect umbellately decompound cymes with divaricate branches; bracts short, pungent, the floral hyaline, acuminate, shorter than the flowers. Sepals $\frac{1}{10}$–$\frac{1}{8}$ in. long, oblong-lanceolate, acute. Petals broader than the sepals, subacute. Stamens 6, shorter than the sepals; filaments filiform, as long as or somewhat longer than the anthers; anthers linear, yellow. Ovary 3-gonous, ovoid; style cylindric, longer than the ovary. Capsules as long as the sepals, 3-gonous-ovoid, mucronate, 3-celled. Seeds ovoid, minute, scarcely $\frac{1}{50}$ in. long, costate and reticulate, pale brown, not tailed. Fl. B. I. v. 6, p. 395; Buchen. in Engl. Bot. Jahrb. v. 12 (1890) p. 277; Boiss. Fl. Orient. v. 5, p. 357; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525.—VERN. *Dher.*

SIND: *Stocks*, 1093!
There is but a single specimen from Sind in Herb. Kew. from Stocks and 1 from Beluchistan.—DISTRIB. Beluchistan; westward to Persia, Arabia, and N. & S. Africa.

ORDER CXXXVIII. PALMÆ.

Shrubs or trees, solitary or gregarious, naked or prickly; stem erect, scandent or decumbent, rarely branched above. Leaves alternate, usually crowded at the apex of the stem, plicate in bud, pinnatisect or palmate, rarely entire or 2-pinnatisect; petiole sheathing. Flowers small, hermaphrodite or 1-sexual, usually 3-bracteolate, in branched spikes or panicles, enclosed in one or more large sheathing spathes. Perianth inferior, 2-seriate; segments in each series 3, usually all free, imbricate or valvate. Stamens usually 6, inserted in 2 series opposite the perianth-segments, sometimes 3 opposite the outer series of segments, occasionally many at the base of the perianth, usually included; filaments free or connate, subulate or filiform (rarely flattened); anthers versatile, 2-celled; dehiscence lateral or extrorse. Ovary 1–3-celled or of 3 one-celled carpels; ovules in each carpel 1–2, anatropous, adnate to the wall, base, or top of the cell; stigmas 3, usually sessile. Fruit a 1–3-celled drupe or hard berry, or of 1–3 carpels; pericarp smooth or rough, or clothed with downward-imbricating shining scales. Seeds erect or laterally attached, rarely pendulous; raphe usually branching all over the testa; albumen horny or bony, uniform or ruminate; embryo small, in a cavity near the surface of the albumen.—DISTRIB. Genera about 130; species about 1100, chiefly tropical.

Leaves pinnate or pinnatisect.
Fruit not clothed with scales; stem erect, unarmed; neither the leaf-rhachis nor the spadix nor the sheath produced as an armed flagellum.

Leaves simply pinnate; leaflets induplicate, without midrib; flowers dioecious ..... 1. PHŒNIX.
Leaves simply pinnate, linear or lanceolate, with midrib and reduplicate sides, the terminal leaflets often confluent as a plaited limb.
Spadix androgynous, on the stem below the leaves; clusters of 3 flowers, 1 male between 2 females, all along the spike; stamens numerous ..... 2. PINANGA.
Spadix from the leaf-axils; leaflets præmorse, auricled; stamens ∞ ..... 3. ARENGA.
Leaves twice pinnatisect, the segments very obliquely dimidiate-flabelliform; spadix axillary, followed progressively downwards by alternate male and female spadices ..... 4. CARYOTA.
Fruit clothed with reflexed, shining, closely appressed, imbricating scales; leaf-rhachis or spadix or sheath produced as an armed flagellum ..... 5. CALAMUS.
Leaves flabelliform, fan-like or orbicular.
Spadix axillary, from among the leaves; flowers polygamous ..... 6. NANNORRHOPS.
Spadix terminal; flowers hermaphrodite; monocarpic palms flowering once and then dying ..... 7. CORYPHA.

1. PHŒNIX, Linn.

Tall trees or low shrubs, the entire stem or the upper portion only closely covered by the more or less rhomboid bases of the petioles; stems occasionally branched. Leaves pinnate; leaflets entire, linear, folded longitudinally and attached obliquely with their folded bases to the woody common petiole, the lowest pinnæ often transformed into spines; midrib 0, but a slender nerve on either side of the fold; main nerves longitudinal, parallel; common petiole semiterete or flat, often widening at the base into a sheath, which frequently expands into a mass of tough reticulate fibres. Flowers dioecious, small, yellowish, coriaceous, on usually several branched axillary (interfoliar) erect or drooping spadices. Spathe basilar, complete, coriaceous. MALE FLOWERS: Sepals 3, connate in a cupular 3-toothed calyx. Petals 3, obliquely ovate, valvate. Stamens 6; filaments short, subulate; anthers erect, dorsifixed. Pistillode minute or 0. FEMALE FLOWERS: Sepals 3, connate in a globose accrescent calyx. Petals 3, rounded, imbricate. Staminodes 6, free or connate in a 6-toothed cup. Carpels 3, free; ovules erect; stigmas sessile, hooked. Fruit oblong, terete, 1-seeded, with a terminal stigma, a fleshy pericarp and a membranous endocarp. Seed oblong, ventrally grooved; albumen uniform or subruminate; embryo dorsal or subbasilar.—DISTRIB. Asia and Africa; species about 11.

Tall palms; stems from 15–50 ft. high.
Stem slender, 30–50 ft. high; leaves 7–12 ft. long; fruit orange-yellow ..... 1. *P. sylvestris.*
Stem very stout, 15–20 ft. high; leaves 3–5 ft. long; fruit brown ..... 2. *P. robusta.*
Low palms with very short stems, often stemless.
Stem very short or 0; fruiting peduncles short; bases of leaves thickened and decurrent on the common petiole ..... 3. *P. acaulis.*
Stem ½–10 ft. high; fruiting peduncles long; bases of leaves not thickened and not decurrent on the common petiole ..... 4. *P. humilis* var. *pedunculata.*

1. **Phœnix sylvestris,** *Roxb. Hort. Beng.* (1814) p. 73. A tall graceful palm when not cut for tapping, 30–50 ft. high, with a large thick hemispherical crown; trunk clothed with the persistent bases of the petioles. Leaves greyish-green, 7–12 ft. long, quite glabrous, pinnate; leaflets 6–18 by $\frac{3}{4}$–1 in., fasciculate, 2–4-farious, rigid; petioles short, compressed only towards the apex, bearing at the base a few channelled triangular spines reaching 4 in. long. MALE FLOWERS white, scented. Spadix 2–3 ft. long, erect; branches filiform; peduncle much compressed. Spathes 12–16 in. long, scurfy, separating into 2 boat-shaped valves. Flowers $\frac{1}{4}$–$\frac{1}{3}$ in. long, numerous, angular, oblique. Calyx cup-shaped, with 3 short rounded teeth. Petals 3 or 4 times as long as the calyx, concave, warted on the outside. Filaments very short (scarcely any), free; anthers linear, shorter than the petals. FEMALE FLOWERS: Spadix and spathe as in the male; fruiting peduncles short, about 6 in. long. Flowers distant, roundish. Calyx cup-shaped, obsoletely 3-toothed. Petals 3, very broad, convolutely imbricate. Staminodes 3 or 4. Fruiting-spadix 3 ft. long, nodding, much compressed, of a golden orange color. Fruit 1–1$\frac{1}{4}$ in. long, oblong-ellipsoid, orange-yellow, edible. Seeds $\frac{2}{3}$ in. long, rounded at the ends, grooved on one face, pale brown. Fl. B. I. v. 6, p. 425; Grah. Cat. p. 224; Dalz. & Gibs. p. 278; Griff. Palm. Brit. E. Ind. (1850) p. 141, t. 228, A; Talb. Trees, Bomb. ed. 2, p. 341; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1096; Brandis, Ind. Trees (1906) p. 645; Watt, Dict. Econ. Prod. v. 6, part 1, p. 208.—Flowers: Jan.–Feb. VERN. *Shindi.*

Known as the *Wild Date-Palm* or the *Date-sugar Palm*, cultivated and often self-sown; tolerably common throughout India; common in moist ground throughout the dry districts of the Bombay Presidency, usually along banks and in the beds of streams and watercourses, certainly indigenous (*Talbot*).—DISTRIB. Throughout India, wild or more often cultivated.

The leaves are used for making mats, baskets, brooms, and fans. The petioles are beaten and the fibre twisted into ropes which are employed in drawing water from wells. The fruit is eaten by the poorer classes, but is not palatable. From the juice obtained by tapping the tree, a coarse sugar is manufactured by boiling. See Watt, Dict. Econ. Prod. l. c.

2. **Phœnix robusta,** *Hook. f. Fl. B. I.* v. 6 (1892) p. 427. Trunk 15–20 ft. high and about 15 in. in diam., clothed and appearing tessellated from the spirally arranged small leaf-sheaths. Leaves 3–5 ft. long, glabrous, shining, shorter, broader, thinner, and smoother than those of *Phœnix sylvestris*; leaflets fascicled, quadrifarious, strict, strongly conduplicate. Fruiting peduncle 2 ft. long. Spathe fringed with brown wool on the keel (*Brandis*). Ripe fruit brown (*Prain*).

The plant was collected by Sir J. Hooker on Parasnath in Behar and seems also to have been obtained by Woodrow on a hill near Bhorkas in the Poona districts. (Notes on a journey from Poona to Nagotna in Records Bot. Survey of India.) The great size of the trunks and their tessellated appearance, due to the comparatively small size of the old appressed leaf-sheaths, furnish good characters. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 526, and in Records Bot. Surv. Ind. v. 1, part 6 (1895) p. 94; Brandis, Ind. Trees (1906) p. 645. *Phœnix humilis robusta*, Becc. Males. v. 3 (1886–1890) p. 379.—Flowers: Feb. VERN. *Shelu.*

DECCAN: gregarious on the top of trap hills near Bhorkas (Poona districts), *Woodrow*; Nandgaon (W. Ghâts), *Woodrow*.—DISTRIB. Behar (on Parasnath).

In the place near Bhorkas, where it is locally abundant, it is used largely for the manufacture of date-matting (*Woodrow*).

3. **Phœnix acaulis,** *Roxb. Hort. Beng.* (1814) p. 73; *Buch.-Ham. ex Roxb. Fl. Ind.* v. 3 (1832) p. 783 *. A dwarf palm, often almost stemless; stem bulbiform, 6–10 in. in diam., clothed with the sheaths and the bases of the petioles, the ends of which are often bristly with the protruding hard fibro-vascular bundles. Leaves 2–6 ft. long; leaflets 10–20 by $\frac{1}{3}$–$\frac{2}{3}$ in., stiff, fasciculate, the base thickened and decurrent; petioles 1 ft. or more long, with spines 2–6 in. long. Spadix 6–10 in. long, compressed, rather longer than the spathe; branches very stout, yellow. Spathes about 6 in. long with their bases rather below the surface of the ground. MALE FLOWERS $\frac{1}{4}$–$\frac{1}{3}$ in. long, alternate, solitary, pale-yellow. Stamens 6; filaments very short. Pistillode 0. FEMALE FLOWERS: Spadix and spathe as in the male. Calyx cup-shaped, truncate, with three obscure teeth on the margin. Petals 3, subrotund, thick and fleshy, concave, smooth. Fruiting peduncle short, usually concealed among the leaves. Fruit $\frac{1}{2}$–$\frac{2}{3}$ in. long, oblong-ellipsoid, black when ripe, edible. Seed $\frac{1}{4}$–$\frac{1}{3}$ in. long, deeply grooved. Fl. B. I. v. 6, p. 426; Dalz. & Gibs. p. 278; Griff. Palm. Brit. E. Ind. (1850) p. 137; Talb. Trees, Bomb. ed. 2, p. 342; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1096; Brandis, Ind. Trees (1906) p. 645; Watt, Dict. Econ. Prod. v. 6, part 1, p. 199.—Flowers: Dec.-Jan. VERN. *Shevra*; *Shilind.*

The *Dwarf Date-Palm.* KANARA: Ghâts of the Sirsi taluka (N. Kanara), *Talbot.*—DISTRIB. Northern and Central India, Birma, W. Peninsula.

4. **Phœnix humilis,** *Royle, Illustr.* (1839) p. 394. VAR. **pedunculata,** *Becc. Males.* v. 3 (1886–1890) p. 379. Monœcious, soboliferous; stem $\frac{1}{2}$–10 ft. high, by 9 in. in diam., densely covered with the bases of the fallen petioles more or less spirally arranged; root suckers developing when the primary stem has been burnt or injured. Leaves 4–8 ft. long; leaflets pliable, 10–20 by $\frac{1}{3}$–$\frac{1}{2}$ in., fasciculate, more or less quadrifarious, the uppermost sometimes confluent, base not thickened and not decurrent into the common petiole; petioles 1 in. broad at the base, with spines reaching 3 in. long. Spathe about 8 in. long, with fringed margin. Spadix scarcely exceeding the spathe. Calyx cup-shaped, 3-toothed. Fruiting spadix 3–4 ft. long, the compressed peduncle much elongate. Fruit $\frac{1}{2}$ in. long, at first orange then black, edible. Fl. B. I. v. 6, p. 427; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 526; Talb. Trees, Bomb. ed. 2, p. 342: Brandis, Ind. Trees (1906) p. 645 (in part). *Phœnix pedunculata* (sp.), Griff. Palm. Brit. E. Ind. (1850) p. 139.—Flowers: Dec.-Feb. Doubtfully distinct from *P. acaulis.*

Common on the Ghâts of N. Kanara, *Talbot.*—DISTRIB. Hilly districts of India; China, Cochinchina.

The leaflets are made into mats commonly used for covering bales of red pepper in the Dharwar district (*Talbot*).

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* Roxburgh attributes this to himself in Hort. Beng. (1814), but to Buchanan in Flor. Ind. (1832).

Phœnix rupicola, T. Anders. in Journ. Linn. Soc. v. 11 (1870) p. 13. A small graceful palm a native of Sikkim, occasionally grown in gardens. It develops a stem very slowly and when fully grown the trunk is 12–20 ft. high by 8–10 in. in diam. It has bright green leaves which are somewhat spirally twisted, leaflets 18 by ½–1 in., and an oblong shining yellow fruit ¾ in. long. Fl. B. I. v. 6, p. 425; Woodr. Gard. in Ind. ed. 5, p. 526; Brandis, Ind. Trees (1906) p. 646.

2. **PINANGA,** Blume.

Unarmed; stem erect, annulate. Leaves pinnatisect, with the upper segments confluent. Flowers monœcious, androgynous, ternate, 1 female between 2 males, the clusters in 2 or 4 or 6 series on spadices from the stem below the leaves; spathe solitary. MALE FLOWERS obliquely 3-quetrous. Sepals 3, acute, keeled, not imbricate. Petals 3, ovate or lanceolate, valvate. Stamens 6 or many; anthers subsessile, basifixed, erect. FEMALE FLOWERS much smaller than the males, ovoid or globose. Sepals 3, orbicular, imbricate. Petals 3, orbicular, broadly imbricate. Ovary 1-celled; ovule basilar, erect; stigmas 3. Fruit ovoid or ellipsoid, with fibrous pericarp. Seed ovoid or ellipsoid; albumen ruminate; embryo basilar.—DISTRIB. Tropical Asia and Malaya; species about 24.

1. **Pinanga Dicksonii,** *Blume, Rumphia,* v. 2 (1836) p. 77 *in Obs.* A very slender, smooth, green-stemmed palm; trunk solitary, tall, 16–20 ft. high by 1–2 in. in diam., soboliferous. Leaves pinnate, forked, 4 ft. long; leaflets numerous, sessile, elongate, 12–24 by ¾–1 in., broadly linear, præmorse, 5–7-nerved, the uppermost confluent. Spadix refracted; branches 4–8, stout, densely clothed with imbricating flowers. Spathe simple, rigid, compressed. MALE FLOWERS: Sepals subulate. Petals rather longer than the sepals, ovate, cordate, valvate, tapering at the tips. Stamens numerous, 20–30; filaments very short; pistillode 0. FEMALE FLOWERS: Sepals reniform. Petals similar. Fruit ½–¾ in. long by ⅓ in. in diam., ellipsoid. Fl. B. I. v. 6, p. 409; Talbot, Trees, Bomb. ed. 2, p. 339; Brandis, Ind. Trees (1906) p. 647. *Areca Dicksonii,* Roxb. Fl. Ind. v. 3 (1832) p. 616; Griff. Palm. Brit. E. Ind. (1850) p. 153, t. 231.

KANARA: evergreen forests near the Gairsoppa and Nilkund Ghâts of N. Kanara, gregarious and locally abundant, *Talbot.*—DISTRIB. India (W. Peninsula).

3. **ARENGA,** Labill.

Tall stout palms, flowering first from an upper leaf-axil and successively from the lower; upper portion of trunk densely clothed with the black fibrous remains of the leaf-sheaths. Leaves terminal, long, pinnatisect; leaflets long, linear, usually præmorse, with a midrib and numerous longitudinal nerves and one or two auricles at the base. Spathes many, clothing the peduncle of the spadix. Spadix axillary, large, much-branched; branches slender, pendulous; peduncles short, decurved. Male and female flowers usually solitary and in separate

spadices, rarely 3-nate, a female between two males. MALE FLOWERS symmetric. Sepals 3, orbicular, imbricate. Petals oblong, valvate. Stamens numerous; filaments short; anthers apiculate; pistillode 0. FEMALE FLOWERS subglobose. Sepals cordate. Petals triangular, valvate. Staminodes many or 0. Ovary subglobose, 3-celled. Fruit obovoidly globose, 2–3-seeded; stigmas terminal. Seeds compressed or plano-convex; albumen uniform; embryo dorsal.—DISTRIB. Tropical Asia and Australia; species 10.

1. **Arenga Wightii,** *Griff. in Calc. Journ. Nat. Hist.* v. 5 (1845) p. 475. Monœcious, forming dense clumps by suckers. Trunk 3–10 ft. high, as thick as a man's thigh, soboliferous. Leaves 12–28 ft. long; leaflets alternate, crowded, 3–3½ ft. long by 1½–2 in., linear-ensiform, pale beneath, the margins sparingly toothed from the middle, 2-auricled at the base, the lower auricle very large, 1½–2 in. long, obliquely overlapping the petiole, the apex narrowed, unequally 2-lobed and jagged-toothed. Spadix decurved, pendulous; peduncle about 2 ft. long, quite concealed by the sheathing imbricate lacerate spathes. MALE FLOWERS strongly scented. Branches of the spadix about 2 ft. long, subfastigiate, slender, with a scaly bract at the base of each; flowers distant, rather large, in pairs; buds acute. Sepals 3, orbicular, imbricate, with thick bases. Petals 3, oblong, very thick and coriaceous. FEMALE FLOWERS: Branches of the spadix attenuate towards the ends, where they bear rudimentary flowers. Sepals broadly cordate, small. Petals triangular, acute or cuspidate. Stigmas 3, short, recurved. Fruit spirally arranged and crowded on the lower halves of the branches of the spadix (the upper halves naked), about as large as a crab-apple, globosely turbinate, broader than long, much depressed at the apex, crowned with the remains of the stigmas. Seeds 3, convex on one face, unequally angular on the other, marked with branched veins converging at the apex of the seed, smooth, brown; albumen uniform. Fl. B. I. v. 6, p. 422; Griff. Palm. Brit. E. Ind. (1850) p. 167, t. 235, E; Talb. Trees, Bomb. ed. 2, p. 340; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Brandis, Ind. Trees (1906) p. 648.—Flowers: Nov.–Jan. VERN. *Dhudasal.*

KANARA: Ankola Ghâts of N. Kanara; common on the Mushki Ghât at about 1500 ft. elevation; very common on the Ghâts near the falls of Gairsoppa in evergreen forests; Divimana Ghât (N. Kanara), *Woodrow.*—DISTRIB. India (W. Peninsula).

Arenga saccharifera, Labill. in Mém. Inst. Par. v. 4 (1801) p. 209. A beautiful and magnificent palm with trunk 20–40 ft. high, and large dark-green shining leaves 20–25 ft. long, which take a graceful plume-like curve towards the summit. Fine specimens may be seen in Bombay, where it is grown as an ornamental tree. It is a native of Assam, Birma, and the Malay Peninsula. Fl. B. I. v. 6, p. 421; Griff. Palm. Brit. E. Ind. (1850) p. 164; Woodr. Gard. in Ind. ed. 5, p. 518; Brandis, Ind. Trees (1906) p. 648.

4. CARYOTA, Linn.

Tall unarmed palms with annulate, naked or sheathed trunks, sobolliferous or not, flowering when full grown from the axils of the leaves, beginning at the upper and then successively downwards, after which the plant dies, usually a male and a female spadix alternately. Leaves terminal, usually forming an elongate coma, few, large, bipinnatisect or decompound; leaflets (pinnules) very obliquely dimidiately flabelliform or cuneiform, præmorse or rounded at the tip, their bases swollen at the point of attachment; nerves and veins flabellate. Flowers monœcious, solitary and nude, or ternate with the central flower female, on the slender pendulous branches of axillary (*interfoliar*) much fastigiately branched spadices with short thick peduncles. Spathes 3–5, incomplete, tubular. MALE FLOWERS symmetric. Sepals 3, short, rounded, coriaceous, closely imbricate. Petals 3, larger than the sepals, linear-oblong or ovate-oblong, valvate. Stamens numerous; filaments short; anthers long; pistillode 0. FEMALE FLOWERS subglobose, smaller than the male. Sepals 3, ovate or orbicular, concave, closely imbricate. Petals 3, rounded, valvate. Staminodes 3 or 6 or 0. Ovary obovoid, 3-gonous, 3-celled; ovule in each fertile cell solitary; stigma sessile, 3-lobed. Fruit glabrous, 1–2 (rarely 3) -seeded, crowned by the stigma; sarcocarp full of rhaphides. Seed erect; albumen ruminate; embryo dorsal. — DISTRIB. Tropical Asia, Malaya and Australia; species about 10.

1. **Caryota urens,** *Linn. Sp. Pl.* (1753) p. 1189. Trunk 40–60 ft. high by 1–1½ ft. in diam., cylindric, annulate, not or scarcely sobolliferous, smooth, grey, shining, covered with long shallow cracks with corky edges. Leaves bipinnate, 18–20 by 10–15 ft.; primary divisions 5–6 ft. long, arched and drooping; leaflets 4–8 in. long, fasciculate or alternate, cuneiform, obliquely truncate, irregularly serrate-toothed on the truncate margin, the upper margin produced beyond the leaflets into a tail, flabellately veined, quite glabrous, bright green, shining, the margins at the base recurved; petiole very stout, about 3 in. thick at the base; sheath smooth, with fibrous netted margins. Spadix 10–12 ft. long; branches simple, forming a dense tassel drooping from the stout short peduncle, all reaching the same level. Spathes 1½ ft. long, closely embracing the peduncle of the spadix. MALE FLOWERS: Buds narrowly cylindric, ½ in. long. Sepals cordate, ciliate. Petals coriaceous, concave, reddish. Stamens about 40; filaments short, white; anthers acuminate, as long as the petals. FEMALE FLOWERS: Sepals rather broader than in the male. Staminodes usually 3. Ovule solitary, erect. Fruit ⅔–¾ in. in diam., reddish; pericarp acrid, stinging. Seeds 1 or 2. Fl. B. I. v. 6, p. 422; Grah. Cat. p. 226; Dalz. & Gibs. p. 278; Griff. Palm. Brit. E. Ind. (1850) p. 169; Trim. Fl. Ceyl. v. 4, p. 324; Talb. Trees, Bomb. ed. 2, p. 341; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1093; Brandis, Ind. Trees (1906) p. 654; Watt, Dict. Econ. Prod. v. 2, p. 206.—Flowers during most of the year. VERN. *Bherli-mád.*

Very common in the evergreen forests of the Konkan and N. Kanara.—DISTRIB. Throughout the hotter parts of India; Ceylon, Tropical Asia, Malaya.

The leaves give the *Kittul* fibre, which is very strong and is made into ropes, brushes, baskets, and other articles; the fibre from the sheathing petioles is made into ropes and fishing-lines. The trees are tapped for *toddy*, which when boiled yields coarse sugar (*jaggery*). The pith furnishes a good palatable sago, while the outer part of the stem supplies a hard durable wood used for agricultural purposes and in general use for field-tools.

The tree is known as the *Hill-Palm* or *Sago-Palm*; sometimes called the *Fish-tail Palm*. See Watt, Dict. Econ. Prod. l. c.

5. **CALAMUS,** Linn.

Perennial, armed, usually scandent tufted palms. Leaves alternate, pinnatisect; leaflets acuminate; nerves parallel; rhachis often produced as an armed flagellum; sheath armed, produced into a ligule or ochrea with or without a lateral armed flagellum. Flowers small, polygamo-diœcious, in usually distichous often scorpioid spikelets, solitary or binate (a female, a male, or both) in the axils of the bracteoles of axillary usually much-elongate and much-branched spadices. Spathe tubular or open, persistent, sheathing the peduncle and branches of the spadix, and passing into bracts and bracteoles. MALE FLOWERS: Calyx cupular, 3-toothed. Petals 3, acute, coriaceous, valvate. Stamens 6; filaments short; anthers dorsifixed. FEMALE FLOWERS slightly accrescent; fruiting pedicelliform or explanate. Calyx tubular, 3-toothed. Corolla tubular below, 3-fid; lobes valvate. Staminodes connate into a cup. Ovary incompletely 3-celled, clothed with retrorse scales; ovules basilar, erect; style short or long; stigmas 3. Fruit globose or ellipsoid, beaked; pericarp thin, clothed with appressed, deflexed, closely imbricate scales. Seed subglobose or oblong, smooth or pitted; albumen uniform or ruminate; embryo vertical or basal.—DISTRIB. India, Malay Archipelago, S. China, N. Australia; a few in Tropical Africa; species 160–170.

An extensive climber; stems slender	1. *C. pseudotenuis.*
Stems stout, erect	2. *C. Thwaitesii.*

1. **Calamus pseudotenuis,** *Becc. ex Hook. f. Fl. B. I.* v. 6 (1892) p. 445. Stem slender, extensively climbing; sheaths set with many unequal, straight, flat, very sharp spines reaching sometimes 1 in. long. Leaves about 4 ft. long; petioles 8 in. long, with a few solitary short spreading spines; rhachis not produced into a flagellum, armed with slender flat spines, scurfy when young; flagellum of sheath very long, slender, compressed below, thin, cylindric, and set with half rings of deflexed hooked spines; leaflets 50 or more, nearly equidistant, 8–15 by ¾–1 in., linear-lanceolate, acuminate, thin, with setulose margins; nerves 3–5. MALE FLOWERS: Spikes of the spadix long, slender, decurved. Flowers usually 2–3 together, $\frac{1}{10}$–$\frac{1}{8}$ in. long, subglobose. Calyx cupular, lobes acute. Petals sessile, short, polished. Filaments very short. FEMALE FLOWERS: Spadix very long, slender; branches distant, armed with short deflexed spines. Spathes flattened, the lower elongate, tubular, 2-edged. Fruit ovoid, ⅓–½ in. in diam.; beak stout, ¼ in. long, conical; scales 9–12 in a vertical row, rounded, dull-yellow with brown scarious margins. Trim. Fl. Ceyl. v. 4, p. 330; Talb. Trees, Bomb. ed. 2,

p. 345; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 526; Brandis, Ind. Trees (1906) p. 652.

KANARA: common on the Ghâts of N. Kanara, *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

2. **Calamus Thwaitesii,** *Becc. ex Hook. f. Fl. B. I.* v. 6 (1892) p. 441. Stem stout, erect, 1½ in. in diam.; leaf-sheaths with close, oblique, raised lines which are thickly set with flattened, stiff, sharp, shining, deflexed, ovate-lanceolate or ensiform spines, 1–2 in. long and with smaller narrower erect ones below each line of large ones. Leaves 4½ ft. long; petioles 7–12 in. long, stout, channelled above, set with imperfect rings of flat spines; rhachis not produced into a flagellum, with a raised ridge, set beneath with half rings of straight, slightly deflexed, dark brown spines; leaflets many, 2–2½ ft. by 1½–2 in., equidistant or fasciculate, very acute, with ciliate and spinulose margins, 3-nerved beneath, with the midrib retrorsely spinulose. MALE FLOWERS ovoid, ⅕–¼ in. long. Spadix up to 20 ft. long, very slender, with very long flagella set with half whorls of short, deflexed, hooked spines. Calyx broadly 3-lobed; lobes rounded. Petals ovate-oblong, sessile. Filaments very broad, narrowed at the top into a geniculate tip carrying the versatile anther. FEMALE FLOWERS ⅓ in. long. Spadix with stouter branches than the male. Perianth enlarged in fruit. Fruit seated on the sessile enlarged perianth, ¾–1 in. long including the beak, ellipsoid; beak stout, conical, straight; scales rather large, tumid, with a narrow dark-brown border, shallowly channelled in the centre, 5–6 superposed in each vertical row, dull orange-yellow; albumen uniform. Trim. Fl. Ceyl. v. 4, p. 330; Talb. Trees, Bomb. ed. 2, p. 344; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 526; Brandis, Ind. Trees (1906) p. 652.—Flowers: Feb.–Mar. VERN. *Handibet.*

KANARA: common in the evergreen forests at the foot of the Nilkund Ghât of N. Kanara, *Talbot.*—DISTRIB. India (W. Peninsula); Ceylon.

Calamus Rotang, Linn. Sp. Pl. (1753) p. 325. Sometimes grown in gardens, abundant in the southern part of the Western Peninsula and in Ceylon, but not indigenous in the Bombay Presidency. When young it is a very graceful plant, with pinnate leaves 1–2 ft. long, and with black spines ½ in. long on the stem and leaf-sheaths, but when it attains a height of 5–6 feet and develops its whip-like flagella armed with numerous sharp recurved thorns it is generally considered time to cut it down. Fl. B. I. v. 6, p. 447; Trim. Fl. Ceyl. v. 4, p. 331; Woodr. Gard. in Ind. ed. 5, p. 520; Brandis, Ind. Trees (1906) p. 652.

6. NANNORRHOPS, H. Wendl.

A gregarious, tufted, low-growing, glabrous palm, with prostrate, branching, robust rhizomes or stems. Leaves cuneately flabellate, rigid, plicate, split into curved 2-fid segments; petiole short. Spadix axillary (*intrafoliar*), much-branched; spathes tubular, sheathing. Flowers polygamous. Calyx tubular, membranous, unequally 3-lobed. Corolla 3-partite; segments valvate. Stamens in hermaphrodite flowers

6, in male flowers about 9. Ovary 3-gonous; ovules basilar; style short; stigma 3-toothed. Drupe small, globose or oblong, 1-seeded. Seed free, erect, ventrally hollowed; hilum small; albumen uniform; embryo dorsal or sub-basilar.—DISTRIB. India (Sind and the Panjáb); Afghanistan; species 1.

1. **Nannorrhops Ritchieana,** *Griff. in Calc. Journ. Nat. Hist.* v. 5 (1845) p. 342 (under *Chamærops*). Gregarious, the leaves usually tufted from an underground much-branched rhizome 8–10 ft. long, as thick as a man's arm, at times from an erect branching stem reaching 20 ft. high. Leaves 2–3 ft. long and broad, cuneately flabellate, rigid, plicate, greyish-green, consisting of 8–15 linear rigid segments 12–15 in. long, with often interposed fibres, folded, 2-partite; petioles unarmed, concave, with a mass of rust-colored wool at the base. Flowers polygamous, male and hermaphrodite. Spadix pyramidal; branches ascending and recurved; branchlets slender. Flowers in pairs in the axils of hyaline bracts, distinct or connate, and bicuspidate. Calyx thinly membranous, flat, 3-toothed. Petals connate at the base. Stamens 6 (sometimes 9 in the male flowers), in the male flowers inserted in the corolla-tube, in hermaphrodite flowers in its throat. Ovary 3-celled, narrowed into the short style. Fruit globose or ellipsoid, $\frac{1}{2}$–$\frac{3}{4}$ in. in diam. Fl. B. I. v. 6, p. 429; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 526; Brandis, Ind. Trees (1906) p. 655.—Flowers: Aug.–Nov.

In the Bombay Presidency confined to Sind. SIND: *Woodrow, Talbot, Brandis.*—DISTRIB. India (Panjáb); Afghanistan.

7. CORYPHA, Linn.

Tall, stout, unarmed palms, dying after once flowering and ripening their seed, at the age of between 20 and 40 years. Leaves very large, orbicular or lunate, flabellately multifid, the segments folded lengthwise; petioles stout, concave, spinous at the edges. Flowers small, hermaphrodite. Spadix large, terminal, erect, pyramidally paniculate. Spathes many, tubular. Calyx cupular, 3-fid. Petals 3, connate at the base, ovate, acute, imbricate or subvalvate. Stamens 6; filaments subulate; anthers dorsifixed. Ovary 3-lobed, 3-celled; ovules basilar, erect in each cell; style short, subulate; stigma minute. Fruit usually 1 globose drupe with 2 abortive carpels at the base. Seed erect, globose or oblong; albumen uniform; embryo spiral.—DISTRIB. Tropical Asia; species 6.

1. **Corypha umbraculifera,** *Linn. Sp. Pl.* (1753) p. 1187. Trunk erect, straight, cylindric, 30–80 by 2–3 ft., annulate. Leaves 8–16 ft. in diam., plicate, cleft to about the middle into 80–100 linear-lanceolate acute or 2-fid lobes; petioles 5–10 ft. long, very stout, the margins armed with short, compressed, dark-colored spines. Spadix pyramidal, 10–20 ft. long, decompound, shortly and stoutly pedunculate; peduncles clothed with tubular spathes which are pierced by the primary branches; branches of the spadix forming pendulous spikes. Calyx broadly 3-lobed. Petals oblong, about $\frac{1}{12}$ in. long. Ovary suddenly contracted into the style. Drupe shortly stipitate, globose, $1\frac{1}{2}$ in. in diam., with 2 small arrested carpels at its base. Seeds globose, very hard, smooth and

polished. Fl. B. I. v. 6, p. 428; Grah. Cat. p. 224; Dalz. & Gibs. Suppl. p. 94; Griff. Palm. Brit. E. Ind. (1850) p. 116; Trim. Fl. Ceyl. v. 4, p. 328; Talb. Trees, Bomb. ed. 2, p. 343; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 526; Prain, Beng. Pl. p. 1090; Brandis, Ind. Trees (1906) p. 657; Watt, Dict. Econ. Prod. v. 2, p. 575.—VERN. *Táli.*

KANARA: moist forests of the Kumpta and Honavar talukas of N. Kanara, covering extensive areas near the Gairsoppa and Yena rivers, also on the Yellapur Ghâts; sometimes planted in gardens near the coast, *Talbot.*—DISTRIB. India (Andamans, W. Peninsula); Ceylon; cultivated in Tropical India, Ceylon, and Birma.

The *Talipot Palm* of Ceylon or the *Fan-Palm* of S. India, one of the largest and most imposing of Eastern Palms. The young fruit pounded is used for stupefying fish (*Trimen*). The leaves form mats, fans, and umbrellas (of which latter there is a considerable trade from N. Kanara), and are used for writing on. A kind of bread is made from the pounded soft interior of the trunk. The seeds known as *Bajurbet* (*Talbot*) have the hardness of ivory and are used for making beads and buttons and imported into Europe for the latter purpose.

The following non-indigenous palms, not belonging to any of the foregoing genera, are grown as economic or ornamental plants in the Presidency:—

Areca Catechu, Linn. Sp. Pl. (1753) p. 1189. A graceful slender-stemmed palm; trunk reaching nearly 100 ft. high, scarcely exceeding 1 ft. in diam., green in the upper part, annulate with raised rings which are not quite horizontal but alternately inclined to opposite sides. Leaves pinnate, 4–6 ft. long; leaflets quite glabrous, 1–2 ft. long, with one or several midribs, the upper leaflets confluent. Spadix androgynous, from below the leaves, branched. Lowest spathe large, glabrous, pale straw-colored, parallel-veined. Stamens 6. Fruit 1½–2 in. long, fleshy-fibrous, orange or scarlet, supported by the persistent perianth, the seeds in the upper part.

The *Supâri* or *Betel-nut Palm*, the original country of which is uncertain (said to be Cochinchina), cultivated but never wild throughout the Presidency, very abundantly in the Sirsi and Siddapur talukas of N. Kanara. The wood is used for a variety of purposes; the sheaths of the leaves are made into hats and also used for writing on. The principal product of the tree, however, is the hard seed, which is chewed by the natives with lime and the leaves of the *Piper Betel.* Fl. B. I. v. 6, p. 405; Grah. Cat. p. 225; Dalz. & Gibs. Suppl. p. 95; Trim. Fl. Ceyl. v. 4, p. 321; Talb. Trees, Bomb. ed. 2, p. 339; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Brandis, Ind. Trees (1906) p. 646; Watt, Dict. Econ. Prod. v. 1, p. 291.—VERN. *Supâri.*

Actinorhytis calapparia, H. Wendl. & Drude, in Linnæa, v. 39 (1875) p. 184. A tall palm with slender smooth grey annulate trunk 60 ft. high by 1 ft. in diam., said to be indigenous in the islands of the Malay Archipelago, planted in the *Supâri* (Areca) gardens of the Haiga Brahmins throughout N. Kanara, probably introduced at the same time and along with the *Supâri.* Leaves pinnate, the blade 8 or 9 ft. long by 4½ ft. broad, lanceolate in outline; leaflets 1¼–1½ in. broad, linear, acuminate, equally 2-partite. Fruit orange, pendulous, ovoid, of the size of a large egg. Talb. Trees, Bomb. ed. 2, p. 340 (*capparia*); Woodr. in

Journ. Bomb. Nat. v. 12 (1899) p. 525 (*capparia*). *Areca calapparia*, Blume, Rhumph. v. 2 (1836) t. 100, fig. 2. *Areca cocoides*, Griff. in Calc. Journ. Nat. Hist. v. 5 (1845) p. 454, & Palm. Brit. E. Ind. (1850) p. 150, t. 230, B.—Flowers: Nov.–Jan. VERN. *Rám-supári.*

Wallichia caryotoides, Roxb. Cor. Pl. v. 3 (1819) p. 91, t. 295. A stemless or short-stemmed palm with pinnatisect leaves, a native of Chittagong and Birma, sometimes grown in gardens. The leaves are 4 ft. long, in tufts from the rhizomes; leaflets fasciculate on the lower part of the petiole, cuneate, lobed, the lobes large præmorse. Fl. B. I. v. 6, p. 419; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 525; Prain, Beng. Pl. p. 1094; Brandis, Ind. Trees (1906) p. 655.

Hyphæne thebaica, Mart. Hist. Nat. Palm. v. 3 (1836–1850) p. 225, tt. 131–133. The *Doum Palm* of Upper Egypt, from which it extends to the equator. Stem terete, 10–30 ft. high, dividing into 3 or 4 branches above the middle. Leaves fan-shaped. When seen from a distance against the sky the upper part looks like the letter W. The tree was, according to Graham, introduced into Bombay by Nimmo in 1828, and again by Maccullough in 1837. It is not very attractive as a garden plant, but there are several specimens in the public park at Baroda and at Poona, while there is a fine tree at Sewree in Bombay. The pulp of the fruit is edible. Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 526, & Gard. in Ind. ed. 5, p. 524. *Hyphæne coriacea*, Grah. Cat. p. 224 (*not* of Gaertn.); Dalz. & Gibs. Suppl. p. 95.

Livistona chinensis, R. Br. Prodr. (1810) p. 268. A handsome palm, a native of China and Japan, with a stout obscurely annulate trunk 20–30 ft. high, and large fan-shaped leaves with long pendulous bipartite divisions, on usually long petioles armed with short recurved spines and rising from a network of brown fibres. The length of the petioles depends on the position in which the plant is grown, being longer in slight shade than in the open. Flowers white, with an unpleasant odor (*Griffith*). Fruit-bearing spadix nodding, with subsecund branches. Fruit a dull-blue olive-like drupe. The palm is commonly grown in gardens and does well with ordinary border treatment if watered freely during dry weather. Fl. B. I. v. 6, p. 434; Woodr. in Journ. Bomb. Nat. v. 12 (1899) p. 526, & Gard. in Ind. ed. 5, p. 525; Prain, Beng. Pl. p. 1091. *Livistona mauritiana*, Wall. in Voigt, Hort. Suburb. Calc. (1845) p. 641 (*nomen nudum*).

Oreodoxa regia, H. B. & K. Nov. Gen. & Sp. v. 1 (1815) p. 305. A fine palm with pinnate leaves 4–6 ft. long, leaflets 6–15 in. long and nearly 1 in. broad, a native of Cuba. The lowest pinna is often produced into a long pendulous whip 3–5 ft. in length which in medium-sized plants furnishes an easy means of identification. Fully developed avenues of this palm are among the chief ornaments of the Botanical Gardens at Culcutta and at Peradeniya (Ceylon), and good specimens may be seen in the Victoria Gardens, Bombay, and at Poona (Woodrow). Dalz. & Gibs. Suppl. p. 95; Woodr. Gard. in Ind. ed. 5, p. 525.

Washingtonia filifera, H. Wendl. in Bot. Zeit. v. 37 (1879) p. 68. A tree 20–40 ft. high, a native of California, with circular flabelliform leaves, the segments separated half-way down and the margins fringed with numerous white threads (hence the specific name). The petioles are armed with stout hooked marginal spines. The tree is of rapid growth and bears the full sun in the dry air of the Deccan, where it may be seen at Poona. Woodr. Gard. in Ind. ed. 5, p. 528.

Licuala peltata, Roxb. Fl. Ind. v. 2 (1832) p. 179. A dwarf palm introduced by Nimmo (*fide* Graham), a native of Chittagong, Birma, and the Andamans, with a trunk 6–12 ft. high, sometimes thicker in the upper portion owing to the persistent petiole-bases. Leaves nearly orbicular, 3–5 ft. in diam., peltate, horizontal, divided almost to the petiole into 16–20 cuneate segments, plaited and 6–10-toothed at the apex; petiole about 6 ft. long, the sides armed with strong, sharp, smooth, recurved spines. Spadix erect, longer than the leaves, simply branched, densely covered with greenish-white flowers. Drupe ½ in. long, ellipsoid, red. Fl. B. I. v. 6, p. 430; Grah. Cat. p. 225; Woodr. Gard. in Ind. ed. 5, p. 524; Prain, Beng. Pl. p. 1091; Brandis, Ind. Trees (1906) p. 656; Watt, Dict. Econ. Prod. v. 4, p. 639.

Borassus flabellifer, Linn. Sp. Pl. (1753) p. 1187. *The Palmyra* or *Brab Tree*, a native of Tropical Africa, cultivated and sometimes self-sown. Trunk attains 100 ft. high and 2 ft. in diam. near the ground, with a dense mass of long rootlets, often swollen above the middle, when young covered with dry leaves or the bases of petioles, when old marked with the black narrow scars of the latter. Leaves 3–5 ft. in diam.; segments 60–80, shining, folded along the midrib, linear-lanceolate; petioles 2–4 ft. long, semiterete, the margins with hard spinescent serratures. Flowers diœcious. Spadix very large, simply branched, sheathed with numerous open spathes. MALE FLOWERS small; spikes 1–3 at the ends of the branches, cylindric, densely clothed with imbricating bracts; numerous minute secund spikelets concealed by the bracts so as to appear immersed in the spike, the flowers coming to the surface one by one as they successively open. Stamens 6; filaments connate with the corolla into a stalk. FEMALE FLOWERS larger, globose, 1 in. in diam.; perianth fleshy, greatly accrescent. Sepals imbricate. Petals smaller, convolute. Staminodes 6–9. Ovary 3–4-celled. Fruit a large subglobose brown drupe 6 in. in diam. or more, with 1–3 obcordate fibrous pyrenes, enclosed by the enlarged perianth. Seeds oblong, 3-lobed at the top; albumen uniform, hollow. Fl. B. I. v. 6, p. 482; Trim. Fl. Ceyl. v. 4, p. 336; Talb. Trees, Bomb. ed. 2, p. 343; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Prain, Beng. Pl. p. 1092; Brandis, Ind. Trees (1906) p. 657. *Borassus flabelliformis*, Murr. Syst. ed. 13 (1774) p. 827; Grah. Cat. p. 226; Dalz. & Gibs. p. 278; Watt, Dict. Econ. Prod. v. 1, p. 495.—Flowers: Mar.–Apr. VERN. *Tád*; *Tádi*; *Tár*.

Cultivated throughout India. Every part of the plant is utilized. A gum is obtained from it; the wood is hard, heavy and durable, and used for water-pipes and channels and for posts, rafters, &c.; the leaves are used for thatching, for mats and for writing on; the cut flower-stalks

yield sugar and when fermented a country liquor; the fruit is roasted and eaten. See Watt, Dict. Econ. Prod. l. c.

Cocos nucifera, Linn. Sp. Pl. (1753) p. 1188. *The Cocoa-nut Tree.* An unarmed monœcious palm. Trunk 40–80 ft. high, annulate, thickened at the base, with a mass of rootlets. Leaves 6–15 ft. long; leaflets equidistant, 2–3 ft. long, linear-lanceolate coriaceous; petioles 3–5 ft. long, stout. Spadix 4–6 ft. long, stout, androgynous, at length drooping, simply panicled; branches bearing scattered female flowers (often between 2 males) towards their bases and numerous males above. Lower spathes 2–3 ft. long, oblong, hard, splitting lengthwise. MALE FLOWERS unsymmetric. Sepals small, valvate. Petals ¼ in. long, oblong, acute, valvate. Stamens 6; filaments subulate; anthers linear erect. Pistillode minute or 0. FEMALE FLOWERS larger than the male, 1 in. long, ovoid, supported by broad bracteoles. Perianth accrescent. Sepals 1 in. in diam., round, concave, imbricate. Petals shorter than the sepals, convolute, with imbricate tips. Fruit 8–12 in. long, 3-gonously obovoid or subglobose, green or yellowish; pericarp thick, fibrous; endocarp bony, with 3 basal pores indicating the 3 cells of the ovary; albumen lining the endocarp, the cavity large, filled with a sweet somewhat milky fluid known as *Cocoa-nut milk*. Fl. B. I. v. 6, p. 482; Grah. Cat. p. 225; Dalz. & Gibs. p. 279; Talb. Trees, Bomb. ed. 2, p. 342; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Prain, Beng. Pl. p. 1095; Watt, Dict. Econ. Prod. v. 2, p. 415.—Flowers: throughout the year. VERN. *Narel.*

Planted throughout the Presidency especially near the sea-coast, where it grows better than inland; in fact it is rarely seen at any distance from the coast in Bombay. Its native country is a matter of uncertainty; it is said to be indigenous in Cocos Island and the North Andamans. The uses to which the Cocoa-nut palm is put are amazingly numerous. In Watt's 'Dictionary of Economic Products' a list is given of various articles prepared from the tree exhibited by Mr. Pereira, Head Assistant to the Medical Storekeeper, Bombay, at the Colonial and Indian Exhibition.

The articles exhibited numbered no less than 83. The fibrous pericarp yields coir which is used for ropes, mats, &c., and exported largely. The oil from the nuts is an important article of trade, used for burning, cooking, the manufacture of soap, &c. The sap is drawn regularly from the trees and allowed to ferment and used thus as a beverage or afterwards distilled to make *arrack*.

The ripe cocoa-nuts are largely exported as an article of food. For an exhaustive account of the cocoa-nut industry, see Watt, Econ. Prod. l. c.

Cocos plumosa, Hook. Bot. Mag. t. 5180. A very graceful palm, a native of Brazil, introduced recently into the Bombay Presidency and well worthy of a place in gardens.

The plant has a straight stem and very long pinnate leaves recurved at the end forming a graceful plume. Woodr. Gard. in Ind. ed. 5, p. 522.

Order CXXXIX. PANDANACEÆ.

Dicœcious trees or shrubs, sometimes scandent with aerial roots, the stem often forked and supported, as if standing on stilts, by numerous adventitious roots. Leaves coriaceous, narrow, acuminate, sessile, with a sheathing base, in tristichous spirals, the edges and midrib usually spinous, the spines on the margins erect, those on the midrib usually retrorse; transverse nerves prominent. Spadix axillary or terminal, simple or branched, clothed with leafly spathes; flowers small, crowded or catkin-like; perianth 0; bracts and bracteoles 0. Male flowers: Stamens numerous; filaments free or connate; anthers erect, basifixed. Pistillode small or obsolete. Female flowers: Staminodes small or 0. Ovary 1-celled, free or connate with those of contiguous flowers in phalanges of 2 or more; ovules solitary and suberect, or many and parietal; stigmas subsessile, papillose. Fruit a syncarpium, consisting of numerous more or less obconic drupes, the apex of each drupe or carpel distinct, pyramidal, conical or convex, crowned by the hardened style or stigma. Seeds minute; testa striate; albumen abundant, hard and oily; embryo minute.—Distrib. Tropical Asia, Africa, Australia, Polynesia, Malay Peninsula and Archipelago, New Zealand; genera 2; species about 200.

1. PANDANUS, Linn. f.

Palm-like small trees or shrubs; stems sometimes very short, erect, or procumbent and rooting. Leaves long, spirally arranged at the ends of the branches, sheathing at the base. Flowers dicœcious. Male flowers: Spadix compound, with numerous yellow or white keeled spathes. Stamens numerous, single or united into bundles on the spadix; filaments short or long; anthers sessile, elongate, 2-celled. Female flowers: Spadix simple, protected by leafly spathes. Staminodes 0. Ovary of 1 or several 1-celled carpels, free or connate; ovule solitary in each cell, ascending from the base of a parietal placenta. Fruit an oblong syncarpium, usually solitary, of woody or fleshy thick-walled drupes, which are deciduous singly or in masses from a fleshy receptacle, the upper half of each carpel hollow or filled with a spongy pith-like tissue. Seeds large, strophiolate; albumen fleshy; embryo small; radicle inferior.—Distrib. Asia, Tropical Africa, Australia, and Polynesia; species about 150.

Carpels distinct; spathes of males not scented, yellow; style forked ..... 1. *P. furcatus.*
Carpels connate; spathes of males strongly scented, white; style not forked ..... 2. *P. tectorius.*

1. Pandanus furcatus, *Roxb. Hort. Beng.* (1814) p. 71. A small gregarious tree with trunk 10–30 ft. high, by 6 in. in diam. (in the Bombay Presidency only a spreading bush), branched, with aerial roots from the lower part of the trunk. Leaves dark green, 8–15 ft. long by 3–6 in. wide, with short stout sharp spines on the margins and midrib. Male flowers in compound cylindric spikes 4–6 in. long by ¾–1¼ in. broad, densely floriferous. Spathes golden yellow, inodorous, the lowest

reaching 2½ ft. long by 4 in. wide, produced at the apex into a spinulose 3-quetrous acumen. Staminal-column ⅕ in. long with 3–5 stamens fascicled at the apex; filaments short; anthers ⅓ in. long, linear, mucronate. FEMALE FLOWERS: Syncarpium usually solitary, subtrigonous, orange-red when fully ripe, 6–9 in. long, variable in size; drupes obconic with a convex crown; styles deeply 2–3-forked, shining, spinulose. Fl. B. I. v. 6, p. 484; Dalz. & Gibs. p. 279; Talb. Trees, Bomb. ed. 2, p. 345; Warburg, in Engl. Pflanzenreich, v. 4, part 9 (1900) p. 75; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Prain, Beng. Pl. p. 1101; Brandis, Ind. Trees (1906) p. 659; Watt, Dict. Econ. Prod. v. 6, part 1, p. 4.—Flowers: cold and hot seasons.

S. M. COUNTRY: between Belgaum and Rámghát, *Dalzell & Gibson*; common in the Ghát forests of Belgaum, *Talbot*. KANARA: forming dense almost impenetrable thickets in marshy places near watercourses, *Talbot*.—DISTRIB. India (hills of Khasia and Manipur, Chittagong, Birma, W. Peninsula); Malay Peninsula and Archipelago.

2. **Pandanus tectorius,** *Soland. ex Parkinson, Journ. Voy. H.M.S. Endeavour*, p. 46 (1773). Shrubby, up to 20 ft. high, rarely erect; stem supported by aerial roots. Leaves glaucous-green, 3–5 ft. long, ensiform, caudate-acuminate, coriaceous, the marginal spines pointing forward, those on the midrib pointing forward or backward. MALE FLOWERS: Spadix with numerous subsessile cylindric spikes 2–4 by 1–1½ in., enclosed in long white fragrant caudate-acuminate spathes. Staminal-column ¼–½ in. long; anthers longer than the slender filaments, cuspidate, inserted along the whole length of the upper portion. FEMALE FLOWERS: Spadix solitary, 2 in. in diam. Carpels confluent in obpyramidal groups of 6–10 or fewer; stigmas short, reniform, yellow. Fruit an oblong or globose syncarpium, 6–10 in. long and broad, yellow or red; drupes numerous (50–60), each consisting of 5–12 carpels; carpels 2–3 in. long, turbinate, angular, the crown smooth, convex, more or less depressed round the reniform stigmas. Warburg, in Engl. Pflanzenreich, v. 4, part 9 (1900) p. 46; Brandis, Ind. Trees (1906) p. 659. *Pandanus odoratissimus*, Linn. f. Suppl. (1781) p. 424; Grah. Cat. p. 227; Dalz. & Gibs. p. 279; Trim. Fl. Ceyl. v. 4, p. 339; Watt, Dict. Econ. Prod. v. 6, part 1, p. 5. *P. fascicularis*, Lam. Encyc. Méthod. v. 1 (1783) p. 372; Hook. f. Fl. B. I. v. 6, p. 485; Talb. Trees, Bomb. ed. 2, p. 345; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427.—Flowers: hot and rainy seasons. VERN. *Keura.*

KONKAN: in sandy places near the sea-coast, *Talbot*.—DISTRIB. Sea-coast of the Indian Peninsula on both sides, Sundribans, Birma, Andamans; often planted and known as the *Screw Pine.*

Pandanus Candelabrum, Beauv. Fl. Ow. v. 1 (1804) p. 37. VAR. *variegata*, Hort. ex Nicholson, Dict. Gard. v. 3, p. 16, fig. 17. A native of Java, often grown in gardens, where it is very ornamental if in an isolated position where its gracefully disposed leaves may be seen to advantage. The leaves are 3–6 ft. long by about 4 in. wide, gradually tapering to a fine point, armed with white spines on the margins which point forward, the spines on the back of the midrib pointing partly

forward and partly backward. The ground-color of the leaves is bright green with bands of white extending from the base to the apex. It is a plant of great beauty, growing well in sandy soil if abundantly watered. *Pandanus javanicus* var. *variegata*, Hort. ex Nicholson, Dict. Gard. v. 3, p. 17; Woodr. Gard. in Ind. ed. 5, p. 529.

Pandanus labyrinthicus, Kurz, in Miq. Ann. Mus. Bot. Lugd. Bat. v. 2 (1866) p. 53. A shrub 10–20 ft. high, a native of Sumatra; stem bearing a crown of leaves, branched, erecto-patent, sending out intricate aerial roots on every side. Leaves about 3 ft. long by 1½ in. wide, very acute, glaucescent beneath, spiny on the margins and the apex of the keel. Fruit scarlet when ripe, oblong-ellipsoid, reaching 4 in. long. Bot. Mag. t. 7063; Nicholson, Dict. Gard. Suppl. p. 580. *Pandanus ceramicus*, Woodr. Gard. in Ind. ed. 5, p. 530.

Order CXL. TYPHACEÆ.

Aquatic or palustrine perennial herbs. Leaves linear, erect or floating, sheathing below; nerves parallel. Flowers small, monœcious or, by abortion, dicœcious, small or minute, densely crowded in globose or cylindric 1-sexual bracteate spikes the upper flowers of which are males; bracteoles 0. Perianth of membranous, green scales or slender hairs. Male flowers: Stamens 1–7; filaments free or connate; anthers basifixed, erect, cuneate or linear-oblong, dehiscing longitudinally; connective sometimes produced. Pistillode 0. Female flowers: Ovary superior, 1–2-celled, the cells 1-ovulate; ovules pendulous from the top of the cell; styles free, short or long, persistent, laterally papillosely stigmatic. Fruit small, membranous or drupaceous. Seeds pendulous; albumen fleshy or floury; embryo axile, cylindric, the radical end thickened; plumule in a lateral slit.—Distrib. Genera 2; species about 15, cosmopolitan.

1. TYPHA, Linn.

Marsh herbs. Leaves erect, spongy. Flowers small, in very dense superposed cylindric spikes, often intermixed with hairs with dilated tips. Perianth of capillary hairs or in the male flowers obsolete. Stamens 1 or more; connective thickened at the tip. Ovary often reduced to a clavate-tipped hair, long-stalked, narrowed into a capillary style, with a clavate or filiform stigma. Fruit very minute; pericarp membranous, indehiscent or follicular. Seed with striate testa; albumen floury.—Distrib. Temperate and tropical regions; species about 10.

1. **Typha angustata,** *Bory & Chaub. Exp. Sci. Morée, Bot.* v. 1 (1832) p. 338. A robust plant; stem 5–10 ft. high. Leaves exceeding the flowering stem, ¾–1 in. broad, semicylindric above the sheath. Spikes cylindric, the male and female spikes often separated by a considerable interval, the female spikes pale brown, ⅛–⅞ in. in diam. Female flowers mixed with clavate-tipped pistillodes; bracteoles subspathulate, equalling the linear stigmas, both longer than the hairs. Pollen simple. According to Aitchison (Bot. Afghan Delim. Comm. in Trans. Linn. Soc. N.S. v. 3 [1887] p. 120) the species sometimes

bears male and female flowers on different plants. Fl. B. I. v. 6, p. 489; Bory & Chaub. Nouv. Fl. Pélop. (1838) p. 4; Boiss. Fl. Orient. v. 5 (1881) p. 50; Aitch. in Trans. Linn. Soc. New Series, v. 3 (1887) p. 120; Graebner, in Engl. Pflanzenreich, v. 4, part 8 (1900) p. 14; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Prain, Beng. Pl. p. 1102. *Typha angustifolia*, Sibth. & Sm. Fl. Græc. Prodr. v. 2 (1813) p. 226 (*not* of Linn.); Roxb. Fl. Ind. v. 3 (1832) p. 567; Watt, Dict. Econ. Prod. v. 6, part 4, p. 207. *Typha elephantina*, Grah. Cat. p. 227 (*not* of Roxb.).—Flowers: Aug. VERN. *Pan-kanis*; *Pun*; *Jangli-bajri*.

DECCAN: *Gibson* ex *Graham*; Poona, *Cooke*!, *Woodrow*. SIND: *Stocks*, 542!—DISTRIB. More or less throughout India; N. Asia, N. Africa.

Mats, screens, &c. are made of the reed in Sind and a curious yellow caked substance called *Bur* is made of the flowers and is much eaten by all classes of natives in Sind (*Stocks*).

Typha elephantina, Roxb. Fl. Ind. v. 3 (1832) p. 566, does not appear to be indigenous in the Bombay Presidency. Woodrow (Journ. Bomb. Nat. v. 13 [1901] p. 427) says that it is planted in Bombay, no doubt as an ornamental plant. The leaves are broad, trigonous above the sheath, and the pollen is 4-globate. Graebner, in Engl. Pflanzenreich, v. 4, part 8 (1900) p. 11.

ORDER CXLI. ARACEÆ.

Herbs usually glabrous (rarely armed), with watery, acrid, or milky juice, stemless or with a short stock or corm or tuber; or shrubs with sympodial branches, climbing by aerial roots. Leaves in shrubby species alternate, distichous or spiral; in herbaceous species few, clustered or solitary, radical sometimes appearing without or after the flowers; petiole with a sheathing base; blade entire or lobed or pinnate or perforate, often with cataphyllaries at the base of the leaf-sheaths. Flowers 1-sexual or hermaphrodite, sessile on a spadix which is more or less completely enclosed in a green or colored spathe; when 1-sexual, usually monœcious (rarely dicœcious) with males towards the apex and females at the base of the spadix, often with neuters between them and sometimes with neuters above the males. Perianth 0, or of a few scales (rarely cupular or urceolate). Stamens in hermaphrodite flowers 4–8, in male flowers 1 or more, distinct or confluent; anthers 2–4-celled, free or (in confluent stamens) connate by means of the thickened connective, the cells discrete or contiguous, free or buried in the connective and opening by a terminal pore (rarely by a longitudinal slit); pollen globose or ellipsoid, powdery or conglomerate. Ovary sessile, 1–3-celled; ovules in each cell 1 or more, basilar, apical, axile or parietal; style short or long; stigma discoid or lobed. Fruit of many small free or connate berries or drupes adnate to the spadix. Seeds in each drupe or berry 1 or few (rarely many), small or large, usually embedded in a mucilaginous pulp; albumen copious or 0; embryo axile or in exalbuminous genera thick, with the plumule in a lateral slit.—DISTRIB. Genera about 100; species about 1000, chiefly tropical.

Flowers 1-sexual, monœcious (often dicœcious in *Arisæma*).
- Water or marsh plants; spadix without a barren appendage.
  - Floating stemless herbs; leaves sessile in a rosette-like tuft ..... 1. PISTIA.
  - Submerged, aquatic or marsh herbs.
    - Ovaries in one whorl ..... 2. CRYPTOCORYNE.
    - Ovaries spirally arranged ..... 3. LAGENANDRA.
- Terrestrial tuberous herbs.
  - Spadix with a barren terminal appendage; ovules not parietal.
    - Male flowers stipitate; flowers often dicœcious. 4. ARISÆMA.
    - Male flowers sessile or nearly so; flowers always monœcious.
      - Flowers and leaves present together.
        - Ovules 1–2, basal ..... 5. TYPHONIUM.
        - Ovules many, basal and apical ..... 6. THERIOPHONUM.
      - Flowers appearing before the leaves.
        - Ovules orthotropous; males and females remote; neuters present above the females ..... 7. SAUROMATUM.
        - Ovules anatropous; males and females contiguous; neuters 0 ... 8. AMORPHOPHALLUS.
  - Spadix without a barren appendage; ovules many, parietal.
    - Female inflorescence adnate to base of spathe; stigma stellate ..... 9. ARIOPSIS.
    - Spadix free from the spathe; stigma discoid . 10. REMUSATIA.

Flowers hermaphrodite; stem scandent; spathe small ..... 11. POTHOS.

1. **PISTIA,** *Linn.*

A floating gregarious monœcious stoloniferous herb. Leaves sessile in a close spiral, obovate-cuneate, together forming a cup; veins parallel; stipulary sheaths small, membranous. Spathe small, shortly pedunculate, tubular below, open above; tube short; limb ovate, concave, spreading. Spadix adnate to the back of the tube of the spathe, free above. MALE INFLORESCENCE a whorl of a few sessile connate stamens below the apex of the spadix, with a whorl of minute neuters below it; anther-slits vertical. FEMALE INFLORESCENCE a solitary oblong 1-celled ovary, obliquely adnate to the spadix for nearly its whole length, the tip free, forming a conical style with a discoid stigma; ovules many, crowded on a parietal placenta, orthotropous. Fruit ovoid; pericarp thin, bursting irregularly. Seeds many, oblong or obovoid; testa ultimately rugose; albumen copious, floury; embryo minute, apical, cuneiform.—DISTRIB. Species 1, tropical.

1. **Pistia Stratiotes,** *Linn. Sp. Pl.* (1753) p. 963. A floating stemless stoloniferous herb with a peculiar muriatic odor; roots of tufted simple white fibres clothed with fibrillæ. Leaves 1¼–4 in. long, variable in breadth, obovate-cuneate, rounded or retuse at the apex, densely and closely pubescent on both surfaces; nerves few or many, flabellately arranged, converging within the margin. Spathe about ½ in. long, obliquely campanulate, white, gibbous and closed below, contracted about the middle, dilated and nearly orbicular above.—DISTRIB. Throughout India and Ceylon and the tropics generally. Fl. B. I. v. 6, p. 497; Grah. Cat. p. 200; Dalz. & Gibs. p. 281; Roxb. Cor. Pl. v. 3

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(1819) p. 64, t. 268; Trim. Fl. Ceyl. v. 4, p. 345; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Prain, Beng. Pl. p. 1105; Watt, Dict. Econ. Prod. v. 6, part 1, p. 275.—Flowers: July–Nov.

Common in tanks throughout the Presidency.—DISTRIB. of the genus.

2. CRYPTOCORYNE, Fisch.

Herbs usually marsh or aquatic; stem short or 0 or a creeping rootstock. Leaves narrow or broad. Spathe tubular with connate margins and a transverse septum within below. Spadix very slender, its tip adnate to the septum of the spathe. MALE INFLORESCENCE cylindric. Stamens 1–2, distinct; anthers short, sessile, truncate, cells 2 with conic perforate tips, pollen vermiform. FEMALE INFLORESCENCE a single whorl of connate 1-celled ovaries with a few neuters; ovules many, erect, orthotropous; styles short, recurved. Fruit a fleshy syncarpium, of connate, coriaceous, many-seeded carpels, the valves stellately spreading. Seeds oblong; testa rugose; albumen copious; embryo axile; plumule sometimes germinating in the fruit.—DISTRIB. Species 26, tropical Asiatic.

Tube of spathe longer than the limb ..... 1. *C. retrospiralis.*
Tube of spathe shorter than the limb.
  Limb of spathe transversely rugose or plicate within ..... 2. *C. spiralis.*
  Limb of spathe smooth within..... 3. *C. cognata.*

1. **Cryptocoryne retrospiralis,** *Kunth, Enum.* v. 3 (1841) p. 12. An herb usually submerged; root of fleshy fibres, stem 0. Leaves numerous, radical, 3–18 by ¼–¾ in., narrowly linear or linear-lanceolate, sessile or with a short stout petiole, acute or finely acuminate; midrib slender. Spathe subsessile, nearly as long as the leaves, deep green streaked with purple; tube narrow, longer than the limb, not or scarcely twisted; limb glabrous, closely twisted. Ovaries 5–6; ovules 3 or more; stigmas orbicular. Fl. B. I. v. 6, p. 493; Wight, Icon. t. 772; Engler, in DC. Monog. Phan. v. 2 (1879) p. 625; Engler, in Engl. & Prantl, Pflanzenf. v. 2, part 3 (1889) p. 152, fig. 99 A–C; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Prain, Beng. Pl. p. 1105. *Cryptocoryne Roxburghii,* Dalz. & Gibs. Bo. Fl. (1861) p. 259 (*not* of Schott).

KONKAN: Bombay, *Law!*; banks of the Pen River, *Law!*; beds of rivers in the Konkan, *Gibson!*; bed of the river near Mira, *Gibson,* 151! DECCAN: Poona on river banks, *Ranade!, Woodrow.*—DISTRIB. India (Bengal, Behar, Birma, W. Peninsula).

2. **Cryptocoryne spiralis,** *Fisch. in Linnæa,* v. 5 (1830) p. 428. A small grass-like herb growing on the margins of ditches and ponds, submerged during the rainy season only. Rootstock tuberous, soboliferous; roots vermiform. Leaves 3–8 by ⅓–⅔ in., linear-lanceolate, acute or acuminate, narrowed from the middle to both ends; nerves nearly parallel; petiole short, stout. Spathe subsessile, 3–5 in. long; tube very short, much shorter than the limb, linear-lanceolate, at first twisted, greenish outside, dark purple and transversely lamellate within. Ovaries 5–6; stigmas broadly elliptic. Fl. B. I. v. 6, p. 494; Wight, Icon. t. 773; Engler, in DC. Monog. Phan. v. 2 (1879) p. 628, and in Engl. & Prantl, Pflanzenf. v. 2, part 3 (1889) p. 152, fig. 99 D–G; Trim.

Fl. Ceyl. v. 4, p. 346; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Prain, Beng. Pl. p. 1105. *Arum spirale*, Retz. Obs. fasc. 1 (1779) p. 30; Bot. Mag. t. 2220; Grah. Cat. p. 228.

KONKAN: *Dalzell!*, *Stocks!*—DISTRIB. India (Bengal, W. Peninsula).

3. **Cryptocoryne cognata,** *Schott, in Bonplandia*, Jahrg. 5 (1857) p. 222. Root bulbous, with vermiform fibres. Leaf-blade 6–10 by $\frac{7}{8}$–$1\frac{1}{2}$ in., oblong-lanceolate, narrowed and acute at both ends, the margins undulate; midrib very broad; petioles stout, shorter than or equalling the blade. Spathe reaching 7 in. long, shortly pedunculate; limb much longer than the tube, narrowed into a long tail which (in the Kew specimens at least) is not twisted; tube of spathe reaching 2 in. long. Male inflorescence separated from the female by an interspace of about $1\frac{1}{4}$ in. Fl. B. I. v. 6, p. 494; Engler, in DC. Monog. Phan. v. 2 (1879) p. 629; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427.

There are but 2 sheets in Herb. Kew., the specimens on both of which are from the KONKAN, one collected by *Stocks*, the other by *Law*.—DISTRIB. India (W. Peninsula).

DOUBTFUL SPECIES.

CRYPTOCORYNE DALZELLII, Schott, in Bonplandia, Jahrg. 5 (1857) p. 221. This singular plant, of which Dalzell says he can make nothing, is represented in Herb. Kew. by half a sheet of specimens, chiefly of fruit in various stages, and a drawing. Dalzell says in a note attached to the sheet: "The leaf is lanceolate, without petiole and apparently amplexicaul, the margin transparent and finally crenated; veins parallel; surface woolly as if covered densely with cobweb. No stamens; no ovarium; nothing but what is observed in the drawing. The perianth is fleshy and what appears as the pedicel is solid." The fruit is ovoid, about $\frac{1}{2}$ by $\frac{1}{3}$ in. on a solitary stalk. The seeds are 2-seriate, oblong, subtrigonous. The sheet is marked "*Bombay, Dalzell*," without further information as to locality. Fl. B. I. v. 6, p. 495; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427.

EXCLUDED SPECIES.

CRYPTOCORYNE UNILOCULARIS, Kunth, Enum. v. 3 (1841) p. 13; Wight, Icon. t. 774; Jackson, Index Kewen. v. 2, p. 661. *Cryptocoryne Roxburghii*, Schott, Prodr. Syst. Aroid. (1860) p. 18; Dalz. & Gibs. p. 257; Engler, in DC. Monog. Phan. v. 2 (1879) p. 629. *Ambrosinia unilocularis*, Roxb. Fl. Ind. v. 3 (1832) p. 493.

I can find no evidence of the occurrence of this (a Coromandel plant) in the Bombay Presidency. Dalzell [Bo. Fl. (1861) p. 257] mentions the plant as *common*, but he has supplied no specimens of it, and I am of opinion that the plant he has described (*l. c.*) as *C. Roxburghii* is *C. retrospiralis*, Kunth, of which there are specimens at Kew from the Konkan and Deccan. There is not a single specimen in Herb. Kew. of Roxburgh's plant, nothing but a drawing, and I believe that no specimen is extant. The plant noticed in Woodrow's list from Poona proves to be *C. retrospiralis*.

3. LAGENANDRA, Dalz.

Aquatic herbs with the characters of *Cryptocoryne*, but with many ovaries in close cycles at the base of the spadix.—DISTRIB. Species 5, India and Ceylon.

1. **Lagenandra toxicaria,** *Dalz. in Kew Journ. Bot.* v. 4 (1852) p. 289. Rootstock reaching 2 in. thick, creeping, simple, coriaceous, annulate; root-fibres vermiform. Leaves 6–15 by 2–5 in., elliptic-

oblong, obtuse or acute, margins undulate, entire, base acute or rounded; midrib very stout, with many slender veins diverging from it; petiole as long as the blade, semicylindric, ½ in. in diam.; stipular sheaths acuminate, 2-keeled. Peduncle shorter and more slender than the petiole, compressed. Spathe 3–9 in. long, tubular below; the limb ¾–1½ in. broad, ovate-lanceolate, caudate-acuminate, slightly twisted; tube much shorter than the long-tailed limb. Male inflorescence cylindric; anthers crowded, yellow, the cells with tubular tips. Female inflorescence of many ovaries, in many cycles, crowded in a globose head; stigma sessile, pulvinate, 5-angled; ovules 4–8 on a basal placenta. Syncarpium on a short decurved peduncle, globose, 1½–2 in. in diam.; carpels about ⅓ in. long, partially dehiscent. Seeds ⅜ in. long, narrowly oblong, furrowed. Fl. B. I. v. 6, p. 495; Dalz. & Gibs. p. 257; Engler, in DC. Monog. Phan. v. 2, p. 621; Trim. Fl. Ceyl. v. 4, p. 349; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427.—Flowers: Feb.–Mar. VERN. *Vatsanáb.*

KONKAN: in marshes, *Dalzell.* S. M. COUNTRY: Belgaum, *Dalzell.* KANARA: Koessi (N. Kanara), *Talbot*, 1813!—DISTRIB. India (W. Peninsula); Ceylon.

4. **ARISÆMA,** Mart.

Tuberous monœcious or diœcious herbs. Leaves 1–3, often coming up with the flowers but sometimes after them, trisect or pedate or verticillately 5- or more-sect. Spathe deciduous; tube convolute; limb often acuminate or tailed, usually incurved. Spadix included or exserted, always with a barren appendage which is often long and filiform. MALE INFLORESCENCE of many usually stipitate connate stamens; anthers 2–5, oblong or subglobose, the cells distinct or confluent, dehiscing by pores or vertical slits. FEMALE INFLORESCENCE: Flowers densely crowded; ovary ovoid, oblong or subglobose, 1-celled; ovules 2 or more, basal, orthotropous; style short or 0. NEUTER FLOWERS 0 or few, subulate, above the males or the females or on the appendage. Fruit a 1- or few-seeded berry. Seeds ovoid or globose; testa rather thick; albumen copious; embryo axile.—DISTRIB. Temperate and tropical Asia; N. America; species about 50.

Leaves pedatisect; appendage of spadix elongate, far-exserted . . . 1. *A. tortuosum.*
Leaflets whorled.
  Leaflets sessile.
    Spathe 4–12 in. long with an obtusely acuminate tip; tube narrow, petiole 2 ft. long; peduncle short; appendage narrowly clavate . . . . . 2. *A. Leschenaultii.*
    Spathe 3–5 in. long with an acute (not caudate) tip; tube wide; petiole 1 ft. long; peduncle 1 ft. long; appendage tapering from the base to the tip . . . . . 3. *A. Murrayi.*
  Leaflets petiolate with thread-like tips which are 1–3 in. long; spathe 6 in. long with a caudate tip 3 in. long; petiole 10–14 in. long . . . . . 4. *A. caudatum.*

1. **Arisæma tortuosum,** *Schott, in Schott & Endlich. Meletem.* (1832) p. 17. A tall plant reaching 3 ft. high; tubers spheroidal, up to 4 in. in diam. Leaves 2–3, pedatipartite; petioles 1–3 ft. long, the sheaths often mottled with purple; leaflets sessile or petiolate, 4–8 in. long, of variable breadth, ovate-lanceolate or linear-lanceolate,

subcaudately acuminate, distant or crowded or almost radiately arranged. Peduncle 2–4 ft. long. Spathe 4–6 in. long, green outside; tube about as long as the limb, subcylindric, gaping, gradually dilating into the limb, pale purplish inside; limb ovate or ovate-oblong acuminate, broadly cymbiform, incurved. Spadix 1- or 2-sexual; male flowers stalked; appendage very long, much exserted, tapering, like a rat's tail, quite smooth, usually erect at first, then porrect, and again erect. Ovaries ovoid, attenuated into a short style. Berry 4–5-seeded. Fl. B. I. v. 6, p. 502; Engler, in DC. Monog. Phan. v. 2 (1879) p. 545; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Prain, Beng. Pl. p. 1106; Watt, Dict. Econ. Prod. v. 1, p. 312. *Arisæma curvatum*, Dalz. & Gibs. Bo. Fl. (1861) p. 258 (*not* of Kunth); Hook. in Bot. Mag. (1871) t. 5931.

KONKAN: *Stocks*!; Western Ghâts, *Woodrow*.—DISTRIB. India (Manipur, Sikkim-Himalaya, Bengal, W. Peninsula).

2. **Arisæma Leschenaultii,** *Blume, Rumphia*, v. 1 (1835) p. 93. Monœcious or diœcious; tubers 2 in. in diam., globose; roots from the upper side of the tuber. Leaf solitary; petiole stout, 2 ft. long, usually mottled and banded with red and brown; leaflets 5–11, whorled, 4–6 by $1\frac{1}{2}$–$2\frac{1}{2}$ in., sessile, lanceolate, caudate-acuminate, dark green above, paler beneath, base tapering; midrib stout. Peduncle short. Spathe 4–12 in. long, dark green, striped externally with purple; tube as long as the limb, cylindric, narrow, ribbed, erect, gradually dilated into the limb; limb slightly decurved, ovate-lanceolate, cymbiform, terminating in a straight obtusely acuminate tip of variable length. Spadix shorter than the spathe, about 3 in. long, gradually passing into a very narrowly clavate pale-green smooth appendage with a rounded, sometimes verruculose tip. Anthers 3–4-nate, sessile, with a few subulate neuters above them. Ovaries many, minute, densely crowded. Fl. B. I. v. 6, p. 504; Engler, in DC. Monog. Phan. v. 2 (1879) p. 552; Trim. Fl. Ceyl. v. 4, p. 352; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 427; Watt, Dict. Econ. Prod. v. 1, p. 311. *Arum erubescens*, Dalz. & Gibs. Bo. Fl. (1861) p. 258 (*not* of Schott).

KONKAN: Western Ghâts, *Woodrow*. S. M. COUNTRY: between Rámghât and Belgaum in the rains, *Dalzell & Gibson*.—DISTRIB. India (Nipal, Khasia Hills, W. Peninsula); Ceylon.

3. **Arisæma Murrayi,** *Hook. in Bot. Mag.* (1848) t. 4388. Tubers of the size of small potatoes with root-fibres from the upper side. Leaf solitary, coming up after the flowers, peltate, divided to the base into 5–10 ovate-lanceolate acuminate segments 3–6 by 1–2 in.; petiole reaching 12 in. long. Peduncle 6–10 in. long, slender, reddish, round, smooth, coming up before the leaves. Spathe striate, 3–5 in. long, green at the base, forming a wide tube for more than $\frac{1}{3}$ its length; limb ovate, convex, acute, somewhat cucullate, pure white with a purple base. Spadix narrowed from the base upwards; appendage curved, narrowed from the base to the tip, included or exserted. Male flowers scattered, with a few neuters above them. Ovaries numerous, crowded, bright red when ripe, variously compressed. Heads in fruit conical. Fl. B. I. v. 6, p. 507; Dalz. & Gibs. p. 258; Engler, in DC. Monog. Phan. v. 2 (1879) p. 552; Woodr. in Journ. Bomb. Nat. v. 13 (1901)

p. 428; Watt, Dict. Econ. Prod. v. 1, p. 312. *Arum Murrayi*, Grah. Cat. Pl. Bo. (1839) p. 229.—Flowers: May–July. VERN. *Sápacha Kánda* (i. e. Snake root).

KONKAN: *Stocks*!; Matheran, *Cooke*! DECCAN: Mahableshwar, *Cooke*!, *Graham*, *Dalzell & Gibson*; Sinhagad, *Woodrow*; Purandhar, *Bhiva*!; Khandala, *Bhiva*! GUJARAT: Bansda Hill S.W. of Surat, *Law*.—DISTRIB. India (W. Peninsula).

Very common at Mahableshwar, where it is known to the residents as the *Cobra*- or *Snake*-Lily. It appears about the end of May or beginning of June all over the hill, its white flowers without leaves being conspicuous objects throughout the woods. It is equally common at Matheran.

4. **Arisæma caudatum,** *Engler, in DC. Monog. Phan.* v. 2 (1879) p. 559. Tuber depressed-globose. Leaf solitary; petiole stout and as well as the peduncle barred and streaked; leaflets 7, petiolulate, 5 by 2 in. (exclusive of the thread-like tips), cuneately elliptic, acuminate and with long capillary tips 1–3 in. long. Peduncle very short. Spathe 6 in. long (not including the 3 in. caudate tip); tube elongate, cylindric; limb incurved, ovate-lanceolate, rather abruptly narrowed into a very long subulate tail; margins below recurved. Spadix androgynous; appendage included, shorter than the flowering portion, not thickened below, the tip rounded. Fl. B. I. v. 6, p. 508; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428.

KONKAN: *Stocks* (Icon. in Herb. Kew.)!

The description given above is that of Sir Joseph Hooker, made from a drawing by Stocks which is in Herb. Kew. There are no specimens of the plant in Herb. Kew. Engler (*l. c.*) says that he has seen one badly dried specimen.

5. TYPHONIUM, Schott.

Tuberous herbs. Leaves entire, or 3–5-lobed, or pedatisect. Flowers monœcious. Tube of spathe short, convolute, with a constricted mouth, persistent; limb of spathe ovate-oblong, lanceolate, or linear, deciduous. Spadix usually exserted, with a long smooth barren appendage. Male and female inflorescences distant, with neuters above the females and sometimes also below the males. MALE INFLORESCENCE: Stamens 1–3; anthers subsessile, the cells contiguous, opening by pores or chinks; pollen globose. FEMALE INFLORESCENCE: Ovary 1-celled; placenta basal; ovules 1–2, erect; stigma sessile. Fruit of ovoid 1–2-seeded berries. Seeds globose; albumen copious; embryo axile.—DISTRIB. Tropics of the Old World; species about 17.

Leaves bearing bulbs; neuters above the female inflorescence linear	1. *T. bulbiferum.*
Leaves not bearing bulbs; neuters above the female inflorescence clavate or obovoid	2. *T. cuspidatum.*

1. **Typhonium bulbiferum,** *Dalz. in Kew Journ. Bot.* v. 4 (1852) p. 113. A small plant 4–8 in. high; tuber $\frac{1}{5}$–$\frac{1}{2}$ in. in diam. Leaves triangular-hastate, sagittate or cordate, 2–4 in. long and often as broad across the lobes, the angles acute; petiole 5–6 in. long, slender, usually with a pisiform tuber at the top. Peduncle 1–$2\frac{1}{2}$ in. long. Spathe slender, pale rose-colored, 3–5 in. long, convolute; tube $\frac{3}{8}$–$\frac{1}{2}$ in. long. Spadix as long as the spathe, slender, yellow; appendage filiform. Neuters above the female inflorescence linear, erect, yellow. Anthers

sessile, dehiscing by a terminal pore. Pollen rosy, hispid. Style 0. Fl. B. I. v. 6, p. 511; Dalz. & Gibs. p. 258; Engler, in DC. Monogr. Phan. v. 2 (1879) p. 611; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Watt, Dict. Econ. Prod. v. 6, part 4, p. 208.

KONKAN: *Stocks!*; S. Konkan, *Dalzell, Woodrow.*—DISTRIB. India (W. Peninsula).

2. **Typhonium cuspidatum,** *Decaisne, in Nouv. Ann. Mus. Par.* v. 3 (1834) p. 367. Tuber ¾–1 in. in diam., subglobose. Leaves 2–4½ in. long, of variable width, hastately or cordately oblong or lanceolate, acuminate; basal lobes short, subacute; sinus narrow or open; petiole 4–10 in. long. Peduncle slender, long or short. Spathe 4–7 in. long (including the tail), the lower portion lanceolate, produced into a slender tail which reaches as much as 5 in. long. Spadix shortly stipitate; appendage produced into a long filiform tail and as long as or longer than the spathe. Male inflorescence ¼ in. long, cylindric; female shortly cylindric. Neuters above the female inflorescence clavate or obovoid, purple-headed, those above the male subulate, white. Anthers minute, yellow. Ovary clavate, green. Fl. B. I. v. 6, p. 511; Engler, in DC. Monog. Phan. v. 2 (1879) p. 616; Trim. Fl. Ceyl. v. 4, p. 354; Prain, Beng. Pl. p. 1107. *Arum cuspidatum*, Blume, Cat. Hort. Buit. (1823) p. 101. *Arum flagelliforme*, Roxb. Hort. Beng. (1814) p. 65; Lodd. Bot. Cab. (1819) t. 396; Wight, Icon. t. 791.—Flowers: Aug.–Sept.

Rare. KONKAN: Parel near Bombay, *Ranade!*—DISTRIB. India (Bengal, Birma, W. Peninsula); Ceylon, Malay Peninsula and Islands.

6. THERIOPHONUM, Blume.

Tuberous monœcious herbs; stem 0. Leaves few, petiolate, always undivided, cordate or sagittate, appearing simultaneously with the flowers. Tube of spathe short, convolute, constricted at the mouth, persistent; limb deciduous. Spadix slender. Male and female inflorescences distant, the male with subulate neuters above and long narrow clavate ones immediately below it, the female of obconic ovaries at the base of the spadix, the interspace between the female inflorescence and lower neuters naked. Anthers sessile, globose. Ovary sessile, 1-celled; stigmas pulvinate; ovules many, some basilar and some pendulous from the apex of the cell, orthotropous. Berries ovoid or oblong.—DISTRIB. Species 5, all Indian.

1. **Theriophonum Dalzellii,** *Schott, Aroid.* (1853) p. 15. Tuber of the size of a walnut; stem 0. Leaves appearing with the flowers, 4–8 in. long, of variable breadth, elliptic, oblong, or linear, acute or subobtuse, base rounded or hastate, or sagittate; petiole 4–10 in. long. Peduncle stout, 3–6 in. long, from the sheathing base of the leaves, in fruit twisted and curved to the ground. Spathe 4–7 in. long, oblong-lanceolate; tube green when young, soon fading to white; limb flat, deep purple, rapidly fading. Appendage of spadix terete, elongate, purple at the base, greenish-yellow above. Anthers rosy-purple, opening by pores. Neuter flowers greenish-yellow. Ovary green; ovules 4–6, of which 1–3 are pendulous from the top of the cell of the ovary, the

remaining ones basal, erect. Fruit angular, 4–5-seeded. Fl. B. I. v. 6, p. 513; Engler, in DC. Monog. Phan. v. 2 (1879) p. 608; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428. *Tapinocarpus indicus*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 346; Dalz. & Gibs. p. 258. *Tapinocarpus Dalzellii*, Schott, Gen. Aroid. (1858) t. 15.—Flowers: July–Aug.

KONKAN: *Stocks*!, *Dalzell*!; Vingorla, *Dalzell*; moist grassy places in S. Konkan, *Dalzell & Gibson*; Kalyan, *Woodrow*! KANARA: Karwar, *Talbot*, 85!—DISTRIB. India (W. Peninsula).

7. **SAUROMATUM,** Schott.

Tuberous herbs leafing after flowering. Leaf solitary, pedatipartite with a long petiole. Flowers monœcious. Spathe with a short peduncle; tube cylindric, short, the margins connate below; limb very long, narrow, open, reflexed. Spadix sessile, very long, with a slender barren appendage as long as the spathe. Male and female inflorescences short, widely distant, dense-flowered, with a few large clavate neuters close above the females. MALE INFLORESCENCE: Anthers large, sessile, subcompressed, 4-lobed; cells contiguous, opposite, obovate-oblong, opening by terminal pores; connective at length prominent. FEMALE INFLORESCENCE: Ovary oblong, 1-celled, rounded at the apex; ovules 1–2, erect, basal; style very short or 0. Fruit of obpyramidal 1-seeded substipitate berries. Seeds globose or somewhat convex, with an obconic strophiole; albumen copious; embryo axile.—DISTRIB. Tropical Asia and Africa; species about 6.

1. **Sauromatum guttatum,** *Schott, in Schott & Endlich. Meletem.* (1832) p. 17. Tuber large. Leaf pedatisect, 6–12 in. broad; segments 7–15, variable, 2–15 by 1–3 in., elliptic, acuminate, deep green; midrib and veins impressed above, prominent beneath, the lower part of the midrib often spotted; petiole stout, 12–18 in. long, green or spotted. Peduncle rather short, stout, green or spotted. Spathe 12–28 in. long; tube ovoid or subglobose; limb linear-lanceolate, thick, green or yellowish, usually with dark purple spots or blotches, the margins generally purple and waved. Spadix shorter than the spathe; appendage 2–8 in. long, cylindric and obtuse, or narrowed from the base to a fine point, green or dark purple. MALE INFLORESCENCE ½ in. long, about 3 in. above the female. Anthers densely packed. FEMALE INFLORESCENCE ½ in. long. NEUTERS ½ in. long, spreading, close above the female. Fl. B. I. v. 6, p. 508; Engler, in DC. Monog. Phan. v. 2 (1879) p. 570; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1109. *Sauromatum punctatum*, C. Koch, in Wochenschr. v. 1 (1858) p. 263; N. E. Brown, in Gard. Chron. (1880) part 2, p. 134. *Arum sessiliflorum*, Roxb. Fl. Ind. v. 3 (1832) p. 507; Wight, Icon. t. 800.—Flowers: April. VERN. *Nurki.*

KONKAN: *Stocks*; Thana, *Law*, *Lisboa*. DECCAN: Máwal (Poona districts), *Woodrow*; Lanoli, *Woodrow*!—DISTRIB. India (Panjáb, Upper Gangetic Plain, Himalaya from Nipal to Simla, W. Peninsula).

The leaf figured as the leaf of *Pythonium Wallichianum* in the 'Journal of the Bombay Natural History Society' [v. 7 (1893) p. 312, plate D] is that of this plant. The inflorescence figured on the same plate is that of *Amorphophallus commutatus*, Engler.

8. **AMORPHOPHALLUS,** Blume.

Tuberous herbs flowering before or together with the leaves. Leaf solitary, 3-partite; segments pinnatisect. Flowers monœcious. Spathe with an open or convolute funnel-shaped or campanulate limb. Spadix exserted or included; appendage large, short or long. Inflorescence cylindric, dense-flowered; males and females contiguous; neuters 0. MALE INFLORESCENCE: Stamens 2–4; anthers sessile, the cells oblong, opening by apical pores. FEMALE INFLORESCENCE: Ovaries globose, 1-4-celled; ovules in each cell solitary, sub-basal, anatropous; style short or long; stigma entire or 2–4-lobed. Fruit of clustered subglobose or obovoid berries. Seeds large; albumen 0; embryo macropodous.—DISTRIB. Tropics of the Old World; species 30–40.

Leaves bulbiferous	1. *A. bulbifer.*
Leaves not bulbiferous.	
Spathe greenish-pink, 6–10 in. broad; appendage irregularly amorphous, dark-purple	2. *A. campanulatus.*
Spathe brownish-purple, 2–5 in. broad; appendage terete, smooth, cream-colored	3. *A. commutatus.*

1. **Amorphophallus bulbifer,** *Blume, Rumphia,* v. 1 (1835) p. 148. Tuber globose, 2–4 in. in diam. Leaf 12–18 in. in diam., ultimately bulbilliferous at the base, on the forks and on the nerves above; petiole 3–4 ft. long, spotted; leaflets 3–8 in. long, obovate or lanceolate, with purple edges. Peduncle 8–12 in. long, green and pink, streaked with green or black. Spathe 5–8 in. long, erect, pale-pink or yellowish shaded with pink, rose-pink inside. Spadix sessile; appendage 3–4 in. long, conoid or oblong, rounded at the top, pale flesh-colored or white. MALE INFLORESCENCE reaching 1½ in. long. Anthers short. FEMALE INFLORESCENCE 1 in. long. Stigma 2-lobed. Fl. B. I. v. 6, p. 515; Engler, in DC. Monog. Phan. v. 2 (1879) p. 317; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1109; Watt, Dict. Econ. Prod. v. 1, p. 225. *Arum bulbiferum,* Roxb. Hort. Beng. (1814) p. 65, Bot. Mag. t. 2072 & t. 2508; Grah. Cat. p. 229.—Flowers in April; leaves appear in June and July.

KONKAN: S. Konkan, *Graham.* S. M. COUNTRY: Londa, *Woodrow.* This is included on the authority of *Graham,* who gives the S. Konkan as its habitat, and of *Woodrow,* who reports its occurrence at Londa near Dharwar in the S. M. Country. I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew.—DISTRIB. India (Bengal, Sikkim, Khasia Hills, Birma, W. Peninsula).

2. **Amorphophallus campanulatus,** *Blume ex Decaisne, in Nouv. Ann. Mus. Par.* v. 3 (1834) p. 366. Tuber depressed-globose, 8–10 in. in diam., bulbiferous, dark brown. Leaves appearing long after the flowers, 1–3 ft. broad; segments spreading, simple or forked; petioles 2–3 ft. long, stout, warted, dark green, with paler blotches; leaflets 2–5 in. long, of variable width, obovate or oblong, acute, strongly many-veined, with green edges. Peduncle short, stout, elongating in fruit; sheaths linear-oblong. Spathe campanulate, pointed, 6–10 in. broad, strongly closely veined, with recurved undulate and crisped margins, greenish-pink externally with pale ocellated blotches, base within purple. Spadix as long as the spathe; appendage varying in size up to 8 by 5 in., globose, conoid or amorphous, sinuately lobulate,

dark red-purple, spongy within. MALE INFLORESCENCE subturbinate, about 3 in. long, 1–2 in. in diam. Anthers densely crowded, pale-yellow; pollen golden-yellow. FEMALE INFLORESCENCE 3 in. long or more, reaching 2½ in. in diam. Ovaries densely crowded, sessile, depressed-globose; style ½ in. long, stout, ascending, purple; stigma large, 2–3-lobed. Berries red, 2–3-seeded, obovoid. Fl. B. I. v. 6, p. 513; Dalz. & Gibs. p. 259; Engler, in DC. Monog. Phan. v. 2 (1879) p. 309; Trim. Fl. Ceyl. v. 4, p. 355; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1109; Watt, Dict. Econ. Prod. v. 1, p. 225. *Arum campanulatum*, Roxb. Cor. Pl. v. 3 (1819) p. 68, t. 272; Grah. Cat. p. 228; Wight, Icon. t. 785.—VERN. *Suran.*

Cultivated in Bombay gardens for the large tuberous roots which are eaten; also to a considerable extent in the Deccan and Gujarat. Dalzell says that it grows wild on the banks of rivers in the Southern Konkan.—DISTRIB. Cultivated largely throughout the plains of India and Ceylon.

3. **Amorphophallus commutatus,** *Engler, in DC. Monog. Phan.* v. 2 (1879) p. 319. Annual; tuber oblate-spherical, 4 by 2 in., depressed above. Leaf solitary, appearing a month or more after the flowers, about 2 ft. in expansion, 3-sect *, each primary division 2-sect; petiole reaching 2 ft. long by ¾ in. in diam., tapering upwards, solid, rough and variously spotted. Leaflets: 1 terminal 4½ by 2 in., 2 decurrent on each side and 2 below the bifurcation, reducing in size downwards. Peduncle 1–3 ft. long by about ¾ in. in diam. at the base, tapering upwards, variously spotted with purple and white and rough with minute spinules; cataphylls 2 (sometimes 3), sheathing the base of the peduncle, pale rose-colored, acute, the longest about 4 in. long. Spathe thick, brownish-purple outside, pinkish-purple inside, 6–10 by 2–5 in., ovate-lanceolate, acute or acuminate, broadest at the middle, rough inside at the base, obtuse at the tip. Spadix sessile, columnar; appendage as long as or longer than the spathe, cream-colored, terete, smooth, not contracted above the inflorescence, the tip obtuse. MALE INFLORESCENCE 1–2 in. long. Anthers sessile, at first round, straw-colored, changing to brownish-purple and becoming enlarged and irregularly quadrate in outline. FEMALE INFLORESCENCE: Ovaries numerous, 1-celled; ovule solitary; stigma sessile, disciform, orange-red. Fl. B. I. v. 6, p. 515; Lisboa, in Journ. Bomb. Nat. v. 10 (1896) p. 527; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428. *Amorphophallus sylvaticus*, Dalz. & Gibs. Bo. Fl. (1861) p. 259 (*not* of Kunth). *Dracontium polyphyllum*, Grah. Cat. Pl. Bo. (1839) p. 229 (*not* of Denst.). *Pythonium Wallichianum*, Kirtikar, in Journ. Bomb. Nat. v. 7 (1893) p. 312 (*not* of Schott) the flower only.—Flowers: May–June. VERN. *Shevla.*

KONKAN: *Stocks, Graham*; S. Konkan, *Dalzell & Gibson*; Western Ghâts from Bombay to Kumpta, *Lisboa*; Marmagão, *Woodrow*!; Matheran, *Cooke*!, *Lisboa*; near Kalyan, *Woodrow*; Shevdi near Bombay, *Woodrow.*—DISTRIB. India (W. Peninsula).

The appearance of the leaves so long after the flowers has rendered it difficult to obtain authentic specimens of the former until the plant was grown by Woodrow in the Botanical Garden of the College of Science at Poona and specimens sent to Kew. The late Dr. Lisboa has described the plant at great length from Woodrow's

* Woodrow has sent to Herb. Kew. an abnormal 5-sect leaf from a tuber planted in the College of Science Bot. Garden at Poona.

specimens in the 'Journal of the Bombay Natural History Society,' v. 10 (1896) p. 527.

The plant is very common at Matheran, where its flowers appear about the end of May. When the anthers are ripe, the odor of the plant is most offensive, resembling carrion, and visitors to the Hill often complain of *defective conservancy* at this time.

9. **ARIOPSIS,** Nimmo.

A small tuberous herb. Leaves entire, peltate. Spathe small, cymbiform, open, persistent; tube 0. Spadix shorter than the spathe; appendage 0. Male flowers cylindric; female adnate to the base of the spathe. MALE INFLORESCENCE: Flowers imbedded in the tissue of the spadix. Anthers connate in groups of 3, each 2-celled, surrounding a pore into which they all open. FEMALE INFLORESCENCE: Ovaries few, oblong, 1-celled, secund; ovules many, orthotropous, 2-seriate, on 4–6 parietal placentas; stigma sessile, stellately 4–6-fid. Berries 3–6-angled, many-seeded. Seeds pendulous; albumen copious; embryo axile.—DISTRIB. Species 1, Indian.

1. **Ariopsis peltata,** *Nimmo, ex Grah. Cat. Pl. Bo.* (1839) p. 252. A small plant; tubers small, green, clustered, with many slender root-fibres. Leaf solitary, 1–6 in. in diam., membranous, peltate, orbicular or shallowly cordate, tip rounded or acute, glaucous beneath; petiole 3–8 in. long, slender. Peduncle 1½–4 in. long, very slender; cataphylls 2 or 3, white spotted with purple, ½–¾ in. long. Spathe ½–⅞ by ⅜–½ in., incurved, apiculate, violet with a green dorsal ridge, paler within. Spadix shorter than the spathe, decurved; appendage 0. Male flowers dark purple; female flowers green. Stigma yellow. Fl. B. I. v. 6, p. 519; Dalz. & Gibs. p. 259; Engler, in DC. Monog. Phan. v. 2 (1879) p. 528; Bot. Mag. t. 4222; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428. *Ariopsis protanthera,* N. E. Brown, in Rep. Roy. Gard. Kew (1877) p. 51. *Remusatia vivipara,* Wight, Icon. t. 900 (*not* of Schott). —Flowers: June–Sept.

KONKAN: *Stocks* !, *Dalzell & Gibson*; Neral below Matheran, *Woodrow.*—DISTRIB. India (W. subtropical Himalaya, Birma, W. Peninsula).

10. **REMUSATIA,** Schott.

Tuberous herbs, emitting long leafless bulbilliferous shoots from the crown of the tuber. Leaf solitary, entire, peltate, coming up after the flowers. Flowers monœcious. Spathe coriaceous, shortly stipitate; tube convolute, constricted at the mouth, accrescent over the fruit; limb broad or narrow, erect, or spreading and reflexed, deciduous. Spadix very short, sessile; appendage 0. Male and female inflorescences distant, with interspersed neuters. MALE INFLORESCENCE forming a clavate mass of densely packed flat-topped anthers mixed with neuters, the individual stamens with a fleshy connective bearing 2–3 small immersed anther-cells opening by terminal slits. FEMALE INFLORESCENCE short, cylindric. Ovaries closely packed, ovoid, 1-celled; ovules many, on parietal placentas, orthotropous; stigma sessile, discoid. Fruit of small clustered berries. Seeds small; albumen copious; embryo axile.—DISTRIB. Species 2, Indian.

1. **Remusatia vivipara,** *Schott, in Schott & Endlich. Meletem.* (1832) p. 18. Tubers 1–1½ in. in diam., clustered, depressed, rooting from the crown; bulbilliferous shoots 6–12 in. long, as thick as a goose-quill, simple or shortly branched, ascending, flexuous, bearing at the nodes clusters of oblong, squarrosely scaly bulbils $\frac{1}{16}$–$\frac{1}{4}$ in. long. Leaves peltate, 5 by 3½ to 18 by 12 in., membranous, orbicular-ovate or -cordate, acute or acuminate, with strong main nerves and fine venation between them; petiole 6–12 in. long, with a short sheath. Spathe 4–5 in long, coriaceous; tube 1–2 in. long, oblong or ovoid, green; limb 2–3 in. long, broadly orbicular-ovate or ovate-cordate, 2–3 in. broad, golden-yellow. Spadix 1–1½ in. long; the male inflorescence ¼ in. long. The plant rarely flowers, but sends up long bulbilliferous shoots from the crown of the tuber. Fl. B. I. v. 6, p. 521; Dalz. & Gibs. p. 259; Engler, in DC. Monog. Phan. v. 2 (1879) p. 496; Trim. Fl. Ceyl. v. 4, p. 358; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1113. *Arum viviparum*, Roxb. Fl. Ind. v. 3 (1832) p. 496; Grah. Cat. p. 228; Wight, Icon. t. 798.

KONKAN: both Konkans, *Nimmo* ex *Graham*; in the clefts of trees in Ghát jungles, *Dalzell & Gibson*; Neral below Matheran, *Bhiva*! DECCAN: Lanoli, *Woodrow*; Khandala, *Woodrow*; Koina Valley below Mahableshwar, *Cooke*!—DISTRIB. India (subtropical Himalaya, Khasia Hills, Chota Nagpur, W. Peninsula); Ceylon, Java.

11. **POTHOS,** Linn.

Evergreen branching shrubs, climbing by aerial roots. Leaves distichous, obliquely linear to ovate, the blade sometimes obsolete; petiole winged or leaf-like, sheathing at the base. Flowers hermaphrodite, all fertile. Peduncles axillary or infra-axillary, leafy, or sheathed, or naked. Spathe small, ovate or concave, coriaceous, persistent. Spadix shorter than the spathe, stipitate. Perianth of 6 segments with hooded tips. Stamens 6; filaments short or long, linear or dilated; anthers terminal, dehiscing by extrorse chinks. Ovary ovoid, oblong, or depressed, 3-celled; ovule solitary in each cell, anatropous, adnate to the inner angle; stigma small, sessile, hemispheric. Berries ellipsoid, often compressed; testa thick; albumen 0; embryo macropodal.—DISTRIB. Tropical Asia, Australia and the Pacific Islands, one species in Madagascar; species about 50.

1. **Pothos scandens,** *Linn. Sp. Pl.* (1753) p. 968. A climbing plant clothing trees and walls like ivy; stem as thick as the little finger, much branched, tough, terete, smooth, leafy; internodes ½–1 in. long. Leaves very variable, 2–4 by ⅓–2 in., obovate, elliptic or lanceolate, acute, acuminate or apiculate, coriaceous, bright green, base cuneate or rounded; petiole broadly winged, 1–3 by ¼–⅔ in., the base ½-amplexicaul. Peduncles $\frac{1}{5}$–⅜ in. long, the base clothed with ovate acute imbricating cataphylls about $\frac{1}{6}$ in. long. Spathe ⅛–¼ in. long, cymbiform, cuspidate, green. Spadix yellow, as long as the spathe, stipitate, globose, ovoid, or shortly oblong, the stipes as long as the inflorescence. Anthers terminal, minute, the cells divaricate. Ovary 3-celled, truncate; stigma minute, lobulate. Berries ½–⅔ in. long, oblong, scarlet, few ripening. Fl. B. I. v. 6, p. 551; Grah. Cat. p. 229; Dalz. & Gibs. p. 257; Engler, in DC. Monog. Phan. v. 2 (1879) p. 84; Trim. Fl. Ceyl. v. 4, p. 364; Woodr.

in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1115.—Flowers: May–July.

KONKAN: *Stocks*!; in dense jungles, *Graham*; Goa jungles, *Dr. Lush* ex *Graham*; Ghát jungles, pretty common, *Dalzell & Gibson*; ravines about Pár (below Mahableshwar), *Graham*; Marmagão, *Bhiva*! KANARA: Kadgal (N. Kanara), *Woodrow*.—DISTRIB. Throughout India; Ceylon, Malay Islands, China.

Pothos aurea, Linden ex André, in Illustr. Hortic. v. 27 (1880) p. 69, t. 381. A showy plant. Leaves 15 by 10 in., ovate, cordate, acute, thick, fleshy, strikingly variegated, of a dark green, boldly and irregularly marked by bands or fantastic-shaped blotches of yellow varying in intensity from cream to orange. Introduced into England from the Salomon Isles in 1880. In the cemetery in Sewree, Bombay, which is close to the sea, very fine specimens may be seen (*Woodrow*). Woodr. Gard. in Ind. ed. 5, p. 545.

Pothos nitens, Bull, Cat. (1887) p. 11. A native of the Eastern Archipelago, grown in conservatories and gardens. Leaves ovate, acute, slightly and unequally cordate at the base, of a dark shining bronzy-purplish green. Woodr. Gard. in Ind. ed. 5, p. 545.

EXCLUDED SPECIES.

SYNANTHERIAS SYLVATICA, Schott, Gen. Aroid. (1858) t. 28. Tuber 1–2½ in. in diam., bulbilliferous. Leaves 1½–2½ ft. in diam.; petiole 1–2 ft. long, pale green with darker streaks. Leaflets few, ovate-lanceolate or oblanceolate. Spathe 1–4 in. long, pale pink spotted with green, purple within towards the base. Appendage of spadix reaching 7 in. long, purple, smooth. Male and female inflorescences distant, with interposed neuters. Fl. B. I. v. 6, p. 518; Trim. Fl. Ceyl. v. 4, p. 357.

I cannot find any satisfactory evidence of the occurrence of this as a Bombay plant. Engler [DC. Monog. Phan. v. 2 (1879) p. 320] gives Bombay as its habitat from the specimens in the Herbarium of Hooker and Thomson, which were however obtained from the Nilghiri Hills and Kurg, localities quite outside the Bombay Presidency. There is in Herb. Kew. a solitary specimen which was presented to the Glasgow Botanic Garden by Mrs. Nimmo, but this is accompanied by no authentic note of locality and may have been collected anywhere. Woodrow gives Marmagão in his list, but the Marmagão plant is *Amorphophallus commutatus*, Engl., which, though quite distinct, has often been mistaken for this.

The plant occurs in S. India and is common in the drier parts of Ceylon.

The following non-indigenous plants not belonging to any of the foregoing genera are more or less cultivated:—

Colocasia Antiquorum, Schott, in Schott & Endlich. Meletem. (1832) p. 18. Rootstock tuberous. Leaves large, ovate, with a broad triangular basal sinus. Spathe 8–18 in. long, caudate-acuminate, erect, pale yellow. Cultivated throughout the hotter parts of India and in all warm regions. All parts of the cultivated plants are eaten, but especially the starch from the tubers which attain 6 in. in diam. Fl. B. I. v. 6, p. 523; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1112; Watt, Dict. Econ. Prod. v. 2, p. 509. *Arum Colocasia*, Linn.

Sp. Pl. (1753) p. 965; Roxb. Fl. Ind. v. 3 (1832) p. 494; Grah. Cat. p. 228. *Caladium ovatum*, Grah. Cat. p. 229 (*not* of Vent.). —VERN. *Alu.*

Alocasia indica, Schott, in Oestr. Bot. Wochenbl. (1854) p. 410. A stout herb; rootstock suberect, large, 3–8 ft. long, 3–8 in. thick with few soboli. Leaves large, ovate, deeply sagittately cordate; lobes rounded, the sinus narrow. Spathe 8–12 in. long, pale yellowish-green. Fl. B. I. v. 6, p. 525; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1111; Watt, Dict. Econ. Prod. v. 1, p. 178. *Arum indicum*, Roxb. Fl. Ind. v. 3 (1832) p. 498; Wight, Icon. t. 794.

Cultivated in native gardens. The stems and rootstocks are eaten. In Bengal they form an important article of food.

Alocasia macrorhiza, Schott, in Schott & Endlich. Meletem. (1832) p. 18. A very stout herb; rootstock suberect, very large, 6–16 ft. long and as thick as a man's arm. Spathe 6–10 in. long, fragrant. A native of Tropical Asia, Australia, and the Pacific Islands. Occasionally grown in native gardens. Fl. B. I. v. 6, p. 526; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1111. *Alocasia odora*, Watt, Dict. Econ. Prod. v. 1, p. 178.

Alocasia metallica, Hook. in Bot. Mag. (1860) t. 5190 (*not* of Schott). A slow-growing plant with leaves 12–18 in. long of a rich bronze color on the upper, purple on the lower side, a native of Borneo, often grown in conservatories; a very ornamental plant.

Alocasia Lowii, Hook. in Bot. Mag. (1863) t. 5376. A very ornamental plant when well grown, a native of Borneo. Leaves 14–16 in. long, cordate-sagittate, olive-green, with thick white ribs, deep purple beneath. Woodr. Gard. in Ind. ed. 5, p. 532.

Caladium. The plants of this genus, which contains perhaps 10 true species all natives of South America, have been so hybridized chiefly from *Caladium bicolor*, Vent., that the florists' varieties have become very numerous. Bull of Chelsea in a list of Caladiums quoted by Woodrow (Gard. in Ind. ed. 5, p. 535) gives about 90 varieties of *Caladium*, several of which have been introduced into Indian gardens, where their ornamental leaves are striking objects between May and October.

Anthurium. Several varieties of this genus have been recently introduced into gardens and conservatories. Some of the hybrids are extremely handsome.

Acorus Calamus, Linn. Sp. Pl. (1753) p. 324. Rootstock as thick as the middle finger, creeping and branching, very aromatic. Leaves 3–6 ft. by $\frac{3}{4}$–$1\frac{1}{4}$ in. Cultivated in native gardens and easily established, though not indigenous. Throughout Asia, Europe, and N. America: known as the *Sweet Flag* in England; formerly used to strew the floors of apartments. Fl. B. I. v. 6, p. 555; Grah. Cat. p. 230; Dalz. & Gibs. Suppl. p. 96; Trim. Fl. Ceyl. v. 4, p. 365; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Watt, Dict. Econ. Prod. v. 1, p. 99. —VERN. *Yekand.*

The root is used medicinally and to keep insects from clothes.

Rhaphidophora pertusa, Schott, in Bonplandia, Jahrg. 5 (1857) p. 45. A lofty epiphytic climber; stem cylindric, reaching 1½ in. in diam., green, smooth, leafy. Leaves 8–18 by 6–10 in., broadly ovate, cuspidate, dark green, often with oblong holes at one side. Spathe shortly pedunculate, yellow. A native of S. India, Ceylon (rare), and the Malay Islands, grown in gardens. Fl. B. I. v. 6, p. 546; Trim. Fl. Ceyl. v. 4, p. 361; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428. *Scindapsus pertusus*, Schott, in Schott & Endlich. Meletem. (1832) p. 21; Wight, Icon. t. 781. *Pothos pertusa*, Roxb. Hort. Beng. (1814) p. 83; Grah. Cat. p. 230.

Order CXLII. LEMNACEÆ.

Small or minute gregarious aquatic herbs, scale-like or globular, without roots or with capillary ones, propagated by buds or bulbils, rarely by seed. Fronds smooth above, spongy below. Flowers monœcious, 1–3, naked or enclosed in a membranous spathe. Perianth 0. Male flowers: Stamens 1 or 2; anthers 1- or 2-celled, the cells superposed, dehiscing by transverse slits. Female flowers: Ovary sessile, 1-celled, narrowed into a funnel-shaped style; ovules 1–7, basal, erect or horizontal; stigma simple. Fruit a minute flask-shaped utricle indehiscent or opening circumscissilely. Seeds erect or horizontal, 1–7; testa coriaceous; albumen fleshy or 0; embryo cylindric, axile.—Distrib. Species about 20, cosmopolitan.

Fronds flat, with 1 or more roots, bearing the flowers in marginal clefts; anthers 2-celled; filaments slender	1. Lemna.
Fronds minute, like grains of sand, rootless, proliferous, bearing the flowers on the upper surface; anthers sessile, 1-celled	2. Wolffia.

1. LEMNA, Linn.

Small herbs; fronds with one or more capillary roots rising from the side or the base. Flowers in marginal clefts of the frond, at first enclosed in a small spathe. Male flowers in pairs, one of each pair opening before the other. Stamen solitary; filaments filiform or enlarged in the middle, recurved; anthers 2-celled, globose, the cells dehiscing by transverse slits; pollen muricate. Female flower: a solitary ovary close to the male; ovules 1–7, anatropous, semianatropous, or orthotropous. Fruit a utricle, 1–7-seeded. Seeds erect or horizontal; embryo conic or ovoid.—Distrib. Species 17, cosmopolitan.

Root solitary.	
Fronds tailed, translucent, thin, the young hastate, set crosswise to the parent frond; seed horizontal	1. *L. trisulca.*
Fronds not tailed, opaque, thick, the young fronds sessile; seed erect	2. *L. gibba.*
Roots many	3. *L. polyrhiza.*

1. **Lemna trisulca,** *Linn. Sp. Pl.* (1753) p. 970. Fronds submerged, ¼–¾ in. long (not including the tail, which often attains ½ in. long), translucent, thin, flat, elliptic-lanceolate or oblanceolate, crenate-serrate near the apex, the young fronds hastate, at length tailed and attenuated into a stalk by which they remain attached to the parent frond, each frond giving rise to a single root-fibre; root-cap acute. Ovule solitary. Seed semianatropous, horizontal; testa rough, grooved.

The young fronds rise at right angles from one or both sides of the parent frond and remain connected with it crosswise. Fl. B. I. v. 6, p. 557; Dalz. & Gibs. p. 281; Engler, in Engl. & Prantl, Pflanzenf. v. 2, part 3, p. 160, fig. 104; Syme, Eng. Bot. ed. 3, v. 9 (1869) p. 17, t. 1394; Boiss. Fl. Orient. v. 5, p. 29; Prain, Beng. Pl. p. 1116; Watt, Dict. Econ. Prod. v. 4, p. 620.

In ponds and tanks in the Konkan, not common.—DISTRIB. Temperate and tropical regions.

2. **Lemna gibba,** *Linn. Sp. Pl.* (1753) p. 970. Fronds floating, suborbicular or obovate, entire, not tailed, $\frac{1}{3}$–$\frac{1}{2}$ in. in diam., opaque, thick, flat above, at length very convex beneath, the young fronds sessile, each giving rise to a single root-fibre, the under surface at length spongy and greatly swollen; root-sheath elongate, cylindric; root-cap acute. Stamens 2. Utricle opening circumscissilely. Seeds erect, anatropous; albumen scanty or 0. Fl. B. I. v. 6, p. 556; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Boiss. Fl. Orient. v. 5, p. 30; Watt, Dict. Econ. Prod. v. 4, p. 620; Syme, Eng. Bot. ed. 3, v. 9 (1869) p. 22, t. 1396.—Flowers: Sept.

DECCAN: Boshri near Poona, *Woodrow.*—DISTRIB. Cosmopolitan.

3. **Lemna polyrhiza,** *Linn. Sp. Pl.* (1753) p. 970. Fronds herbaceous, not tailed, floating, opaque, thick, flat above, slightly convex below, $\frac{1}{4}$–$\frac{1}{3}$ in. in diam., dark green above, usually purplish beneath, 7-veined; epidermal cells with sinuous walls; young fronds sessile, each frond giving rise to a tuft of root-fibres. Spathe 2-lipped. Stamens 2. Ovules 1–2, semianatropous. Fl. B. I. v. 6, p. 557; Trim. Fl. Ceyl. v. 4, p. 367; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1117; Watt, Dict. Econ. Prod. v. 4, p. 620; Syme, Eng. Bot. ed. 3, v. 9 (1869) p. 23, t. 1397. *Spirodela polyrhiza,* Schleid. in Linnæa, v. 13 (1839) p. 392; Engler, in Engl. & Prantl, Pflanzenf. v. 2, part 3, p. 154, fig. 101 A.—Flowers: Sept.

DECCAN: Poona, *Woodrow.*—DISTRIB. Cosmopolitan.

2. **WOLFFIA,** Horkel.

Very minute herbs, flattish, globose or conically produced below, rootless. Flowers inserted in a groove on the upper surface of the plant. Spathe 0. MALE FLOWER solitary. Stamen solitary; filament short or long; anther globose, 1-celled; pollen smooth. FEMALE FLOWER solitary, close to the male. Ovary globose or ovoid; ovule solitary, orthotropous. Fruit a spherical utricle. Seed globose, erect; testa thick; albumen scanty.—DISTRIB. Europe, East Indies, Tropical Africa, Tropical and Temperate America; species 12.

1. **Wolffia Michelii,** *Schleid. Beitr. Bot.* (1844) p. 233. A minute floating annual herb. Fronds opaque, ovate-oblong or subglobose, $\frac{1}{20}$ in. long or less, convex on both surfaces, not tailed, rootless; young fronds solitary and sessile from the very base of the parent frond. Jackson, Index Kewen. v. 4 (1895) p. 1233. *Wolffia arrhiza,* Hork. ex Wim. Fl. Schles. ed. 3 (1857) p. 140; Hook. f. Fl. B. I. v. 6, p. 557; Woodr.

in Journ. Bomb. Nat. v. 13 (1901) p. 428; Prain, Beng. Pl. p. 1117. *Lemna globosa*, Roxb. Hort. Beng. (1814) p. 66; Grah. Cat. p. 252; Dalz. & Gibs. p. 281. *Lemna arrhiza*, Linn. Mantiss. 2 (1771) p. 294; Syme, Eng. Bot. ed. 3, v. 9 (1869) p. 24, t. 1398.

Tanks throughout the Presidency common, covering the water like a green scum.

Order CXLIII. ALISMACEÆ.

Aquatic or marsh herbs, usually erect, sometimes floating. Leaves radical or clustered at the nodes of floating stems, entire, petiolate, often pellucid-dotted or lineolate. Flowers pedicellate, regular, 1-sexual or hermaphrodite, in umbellate or paniculate whorls, usually white or pink; bracts 3 or more, membranous; bracteoles small. Perianth-segments 6 in 2 series, the 3 outer (*sepals*) herbaceous, the inner whorl petaloid, rarely obsolete. Stamens 6 or more (rarely 3), hypogynous or perigynous; anthers erect, basifixed, 2-celled, dehiscing by lateral or dorsal longitudinal slits. Carpels 3–6 or more, 1-celled, sessile or stipitate on a flat or raised receptacle; ovules 1 or more in each carpel; placentas on the inner angle (rarely ovule solitary and basal); style long or short (rarely 0) subterminal or ventral; stigma simple. Fruit of small achenes or follicles. Seeds small or minute; albumen 0; embryo straight or conduplicate.—Distrib. Genera 12; species about 60, cosmopolitan.

Fruit indehiscent of 3 or more achenes.	
Flowers polygamous; stamens 6; receptacle flat	1. Limnophyton.
Flowers 1-sexual; stamens usually many (rarely as few as 6); receptacle globose or oblong	2. Sagittaria.
Flowers monœcious; stamens 3; receptacle small, tumid	3. Wisneria.
Fruit dehiscent of 6–7 follicles; stamens 8–12; flowers hermaphrodite	4. Butomopsis.

1. LIMNOPHYTON, Miquel.

A scapigerous stemless palustrine perennial herb with milky juice. Leaves sagittate, erect. Flowers polygamous (male and hermaphrodite), white, in paniculate whorls. Scapes stout. Receptacle flat. Sepals 3, herbaceous, persistent. Petals 3, membranous, deciduous. Stamens 6 in 2 series, largest in the male flowers; filaments compressed. Carpels 15–20, obsolete in the male flowers; ovule solitary, anatropous, basal; stigma small on a ventral style. Fruit of several compressed or turgid hard achenes. Seeds erect, basal; testa membranous; embryo horseshoe-shaped.—Distrib. Asia and Tropical Africa; species 1.

1. **Limnophyton obtusifolium,** *Miq. Fl. Ind. Bat.* v. 3 (1855) p. 243. Rootstock short, stout, with numerous long root-fibres. Leaves all radical, 6–12 by 4–8 in. (sometimes as broad as long), reniformly or deltoidly sagittate or triangular, acute or subobtuse, or with rounded tip; basal lobes long, tapering to a fine point, spreading, as long as the rest of the blade, the sinus very broad, open; primary nerves 6–8 pairs, radiating from the top of the petiole, with irregular reticulate venation between them; petiole 1–3 ft. long, stout, striate, channelled above. Panicle with a stout angular scape 2–4 ft. long; branches long, erecto-patent, the lower branches usually in 4 whorls; bracts whorled, broadly ovate-lanceolate, acuminate, with many parallel

nerves, the lower reaching 1 in. long. Flowers many, $\frac{1}{3}$–$\frac{1}{2}$ in. in diam., white, in whorls at the nodes of the branches of the panicle 4–15 in a whorl, the upper whorls mostly male, the lower hermaphrodite; pedicels 1–3 in. long, those of the male flowers more slender than the female. Sepals 3, orbicular-ovate, concave, ribbed, green. Petals 3, broadly obovate, $\frac{1}{6}$ in. long and broad. Filaments 6, flattened, with dilated bases. Achenes in a globose head $\frac{1}{2}$–$\frac{3}{4}$ in. in diam., obovoid, turgid, wrinkled. Fl. B. I. v. 6, p. 560; Micheli, in DC. Monog. Phan. v. 3 (1881) p. 39; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1119. *Sagittaria obtusifolia*, Linn. Sp. Pl. (1753) p. 993; Grah. Cat. p. 199; Dalz. & Gibs. p. 249.—Flowers: Feb. VERN. *Nalkut.*

KONKAN: *Stocks*!; tanks throughout the Konkans, *Graham.* KANARA: Halyal tank, *Ritchie*, 1390! GUJARAT: *Dalzell & Gibson*: Ankleshwar near Broach, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon, Tropical Africa, Madagascar.

2. SAGITTARIA, Linn.

Erect, stemless, usually perennial aquatic herbs. Leaves with long petioles, elliptic, cordate or sagittate. Flowers 1-sexual or polygamous, in paniculate or spicate whorls. Sepals 3, herbaceous, persistent. Petals 3, membranous, deciduous. Stamens in male flowers about 24 with only staminodes in the female flowers, or 6–10 in the male flowers with 9–12 in the hermaphrodite; filaments filiform, compressed. Carpels very many, crowded on a large globose or oblong receptacle, flattened laterally. Ovary solitary, basal; style ventral or apical; stigma papillose. Fruit a globose or oblong head of flattened crested or winged achenes. Seed erect, basal; testa thin; embryo horseshoe-shaped.—DISTRIB. Species about 15, temperate and tropical.

1. **Sagittaria sagittifolia,** *Linn. Sp. Pl.* (1753) p. 993. Rhizome thick, tuberous, stoloniferous. Leaves radical, 2–8 in. long, very variable, the first leaves of the young plants very slender and very acute, the next one or two simply cordate-oblong, the rest sagittate, acute, smooth, with more or less divergent basal lobes which are 2–3-nerved and narrower than the upper part of the blade, which latter is oblong or lanceolate, acute, 5-nerved, the nerves extending from the top of the petiole to the apex of the leaf; petioles sometimes reaching nearly 2 ft. long, 3-gonous. Scape 6–18 in. long. Flowers $\frac{1}{2}$–$\frac{3}{4}$ in. in diam., white, often with a purple claw, in 3–5 whorls along the scape with 3-5 (usually 3) flowers in each whorl, the lower whorls female, the upper male, with longer pedicels (hermaphrodite flowers occur sometimes, but rarely); bracts narrowly ovate, membranous. Sepals ovate, acute, much smaller than the petals. Petals large, broadly obovate. Filaments in the male flowers very many, absent in the female flowers; anthers sagittate. Achenes obliquely obovate, flattened, apiculate, winged, the wings broad, entire or subcrenate. Fl. B. I. v. 6, p. 561; Grah. Cat. p. 199; Buchenau, in Engl. & Prantl, Pflanzenf. v. 2, part 1, p. 231, fig. 176; Micheli, in DC. Monog. Phan. v. 3 (1881) p. 66; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1120; Syme, Eng. Bot. ed. 3, v. 9 (1869) p. 68, t. 1436; Watt, Dict. Econ. Prod. v. 6, part 2, p. 383.—Flowers: Sept.

Rare in the Bombay Presidency. KONKAN: *Stocks*!; Malwán, *Woodrow.*—DISTRIB. Europe, Asia, N. America.

3. **WISNERIA,** Micheli.

Scapigerous marsh herbs. Leaves radical, long-petiolate, narrowly lanceolate. Flowers monœcious, in remote involucrate whorls on a slender rhachis; involucre campanulate, truncate, membranous. Sepals 3, equal or one longer, persistent. Petals 2–4, equalling or smaller than the sepals. MALE FLOWERS: Stamens 3. Pistillodes subulate. FEMALE FLOWERS: Staminodes 3, setaceous. Carpels 3–6, erect, ovoid; receptacle small, tumid; ovule solitary, basal; style 0 or terminal; stigma minute. Achenes and seed subglobose or compressed; testa thin; embryo horseshoe-shaped.—DISTRIB. Asia; Africa, and Madagascar; species 3.

1. **Wisneria triandra,** *Micheli, in DC. Monog. Phan.* v. 3 (1881) p. 82. A herb about 1 ft. high; root fibrous. Leaves glabrous, long-petiolate, longer than the scape, reaching with the petiole 9–15 in. long, the blade less than ½ in. broad, narrowly linear-spathulate; obtusely keeled on the back; midrib stout, penninervuled, the lateral nerves slender, submarginal; petioles terete, sheathing at the base, twice as long as the leaf-blade. Scape erect, simple, terete, 5–6 in. high, floriferous at the apex, obtusely 3-gonous. Whorls of flowers 6–8, of which the 1–2 lower consist of females, the upper of males. Flowers white, usually 3 in a whorl; pedicels short, longer than the bracts; bracts connate, sheathing, obtuse. Sepals 3, linear-oblong. Petals 3, shorter than the sepals. MALE FLOWERS: Stamens 3, opposite the sepals; anthers didymous; filaments short. FEMALE FLOWERS: Achenes few, subglobose or obovoid, smooth. Fl. B. I. v. 6, p. 562; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429. *Sagittaria triandra,* Dalz. in Kew Journ. Bot. v. 2 (1850) p. 144; Dalz. & Gibs. p. 249.—Flowers: Aug.

KONKAN: Malwán, *Dalzell!, Woodrow.*—DISTRIB. India (W. Peninsula).

4. **BUTOMOPSIS,** Kunth.

An annual scapigerous marsh herb with milky juice. Leaves radical, elliptic, acute. Flowers hermaphrodite, umbellate on a scape; whorls sometimes superposed, bracteate. Sepals 3, herbaceous, persistent. Petals 3, membranous, deciduous, white, larger than the sepals. Stamens 8–12 (usually 9), hypogynous; 6 outer in pairs opposite the sepals, sometimes one of a pair obsolete; 3 inner single, opposite the petals, sometimes one or more replaced by a pair; filaments filiform; anthers oblong. Carpels 6–9, whorled, on a flat receptacle, sessile, shortly connate below, 1-celled; ovules many, small, on reticulate parietal placentas, ascending, anatropous; style short. Fruit of 6–7 erect membranous follicles. Seeds numerous, minute, parietal, smooth; embryo conduplicate, horseshoe-shaped.—DISTRIB. Asia, Africa, Tropical Australia; species 2.

1. **Butomopsis lanceolata,** *Kunth, Enum.* v. 3 (1841) p. 165. Rhizome small, sending out leaves above, fibrous roots below. Leaves 2–6 by ⅝–2¼ in., elliptic-lanceolate, acute, membranous, quite entire, attenuated into the petiole; main nerves 5–7; petioles dilated at the base, reaching 8 in. long. Scape usually longer than the leaves, stout,

bearing an umbel of 3–20 flowers at its apex; bracts below the umbel scarious, $\frac{1}{2}$–$\frac{5}{8}$ in. long, ovate, acute; pedicels very variable in length, 1–6 in. long in the same umbel. Sepals 3, herbaceous, $\frac{1}{3}$ by $\frac{1}{4}$ in., elliptic, obtuse, reticulately veined, persistent. Petals white, fugacious. Follicles 6–7, reticulately veined, tapering into short beaks. Seeds very numerous, oblong, with rounded ends, about $\frac{1}{40}$ in. long, dark brown, shining. Fl. B. I. v. 6, p. 562; Dalz. & Gibs. p. 249; Micheli, in DC. Monog. v. 3 (1881) p. 87; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1120. *Butomus lanceolatus*, Roxb. Hort. Beng. (1814) p. 89; Grah. Cat. p. 251.—Flowers: Nov.

Rare in the Bombay Presidency. GUJARAT: tank at Chikli near Surat, *Law* ex *Graham*; Godra, *Woodrow*.—DISTRIB. Plains of India; Tropics of the Old World, Australia.

ORDER CXLIV. NAIADACEÆ.

Aquatic or marsh herbs of various habit; rootstock stout or slender, sometimes tuberous, often creeping or 0; stem floating or rooted in the ground. Leaves entire or serrate, submerged or floating, sheathing at the base, sometimes stipulate. Flowers 1- or 2-sexual, green, usually inconspicuous, in spikes, racemes, or terminal or axillary pedunculate spadices; bracts small or 0. Perianth 0, or of 3–4 inferior valvate segments, or tubular and very delicate. Stamens 1–6, hypogynous, free in 2-sexual flowers, solitary or connate in male flowers; anthers 1–2-celled. Carpels 1–6; ovules 1 or more in each carpel, erect or pendulous; style long or short; stigma usually simple, sometimes stigmas 2–3 capillary. Fruit various. Seeds erect, pendulous, or laterally peltate; testa coriaceous or somewhat fleshy; albumen 0; embryo fleshy, straight.—DISTRIB. Genera 16; species about 150, temperate and tropical.

Flowers 2-sexual.
- Perianth of sepals present; carpels sessile.
  - Sepals 1–3, white, pink or pale blue, membranous; stamens 6 or more ..... 1. APONOGETON.
  - Sepals 4, green, herbaceous; anthers 4, sessile..... 2. POTAMOGETON.
- Perianth wanting; carpels stipitate; anthers 2, sessile ... 3. RUPPIA.

Flowers 1-sexual.
- Style long, slender; stigma oblique, peltate; achenes 2–9; male perianth wanting..... 4. ZANNICHELLIA.
- Style wanting; stigmas 2–4, slender; achene solitary; male perianth double ..... 5. NAIAS.

1. APONOGETON, Linn. f.

Scapigerous fresh water herbs; rootstock tuberous, crowned by numerous root-fibres. Leaves oblong, floating or submerged, membranous. Flowers 2-sexual, on long scapes bearing solitary or geminate, often unilateral spikes, which when young are enclosed in a conical quickly deciduous sheath. Perianth of 1–3 equal or unequal pink, white, or pale blue segments or obsolete. Stamens 6 or more; filaments subulate, unequal, persistent; anthers didymous. Carpels 3–6; ovules 2 or more in each carpel, basal, anatropous; style short or 0; stigma discoid or decurrent, persistent. Seeds erect; testa thick or thin; albumen 0; embryo straight.—DISTRIB. Species 22, Asiatic, African, and Australian.

1. **Aponogeton monostachyon,** *Linn. f. Suppl.* (1781) p. 214. An aquatic herb; rootstock $\frac{1}{3}$–$\frac{1}{2}$ in. in diam., stoloniferous, edible. Leaves floating, $2\frac{1}{2}$–8 by $\frac{3}{4}$–$1\frac{1}{2}$ in., oblong or linear-oblong, acute or obtuse, base cuneate, rounded, or cordate, 3–5-nerved and with numerous distinct cross nervules between them; petioles varying with the depth of the water, often very long, subtrigonous. Scape varying with the depth of the water; spike solitary, 1–6 in. long, dense- or lax-flowered; flowers white, pink or pale blue. Sepals 2, obovate or suborbicular, $\frac{1}{10}$ in. long and broad. Stamens 6, as long as or longer than the perianth-segments; anthers bluish-purple. Carpels 3. Follicles subglobose; style subulate. Seeds 4–8, oblong; testa lax, 6–8-ribbed, striate. Fl. B. I. v. 6, p. 564; Grah. Cat. p. 200; Dalz. & Gibs. p. 248; Trim. Fl. Ceyl. v. 4, p. 372; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1122; Watt, Dict. Econ. Prod. v. 1, p. 277.—Flowers: July–Dec.

KONKAN: *Stocks!*, *Graham*; Salsette, *Graham*. S. M. COUNTRY: tanks in the Dharwar and Belgaum Collectorates, *Dalzell & Gibson*; Samasji (Dharwar districts), *Woodrow!* GUJARAT: Godra, *Woodrow.*—DISTRIB. Throughout India; Ceylon, Tropical Asia, and Australia.

2. POTAMOGETON, Linn.

Aquatic submerged herbs with creeping rootstock. Leaves submerged or floating, opposite or alternate, entire or toothed; stipules interfoliaceous. Flowers minute, hermaphrodite, spicate on a short or long axillary or leaf-opposed peduncle arising from a sheath; bracts 0. Perianth of 4 concave green valvate segments. Stamens 4; anthers sessile at the base of the segments of the perianth, didymous. Carpels 4, free, sessile, 1-celled and 1-ovulate; ovule campylotropous, adnate to the inner angle of the carpel; stigma subsessile or decurrent, persistent. Fruit of small coriaceous or spongy drupelets. Seed subreniform; embryo macropodal.—DISTRIB. Species about 80, cosmopolitan.

Upper or all leaves floating	1. *P. indicus.*
Leaves all submerged.	
Leaves amplexicaul, ovate, cordate, entire, translucent, 5–9-nerved; stem stout; peduncle short; spike dense-flowered	2. *P. perfoliatus.*
Leaves semiamplexicaul, linear-oblong, crisped, serrulate, translucent, 3-nerved; stem slender; peduncle long; spike few-flowered	3. *P. crispus.*
Leaves filiform, opaque; stem filiform; flowers in distant whorls on the peduncle	4. *P. pectinatus.*

1. **Potamogeton indicus,** *Roxb. Fl. Ind.* v. 1 (1832) p. 452. Stem terete, branched, smooth, its length depending on the depth of the water. Leaves petiolate; the upper floating, $2\frac{1}{2}$–4 by 1–$1\frac{1}{2}$ in., alternate or uppermost opposite, oblong or elliptic-lanceolate, acute, obtuse or acuminate, thinly coriaceous, opaque, glossy, many-nerved, base acute or rounded, the petioles variable in length with stipules 1–$1\frac{1}{2}$ in. long, free; the lower submerged leaves reaching 8 in. long, membranous, undulate, with petioles shorter than the blade. Peduncles axillary or leaf-opposed, 1–2 in. long, stout or slender, not thickened upwards. Spike $1\frac{1}{2}$ in. long, dense-flowered, green. Sepals 4, clawed, $\frac{1}{10}$ in. long,

including the claw which is nearly as long as the limb; limb suborbicular, $\frac{1}{16}$–$\frac{1}{12}$ in. broad, concave. Drupelets $\frac{1}{8}$ in. long, obliquely truncate, shortly beaked. Fl. B. I. v. 6, p. 565; Grah. Cat. p. 200; Dalz. & Gibs. p. 248; Trim. Fl. Ceyl. v. 4, p. 373; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1122.—Flowers: Dec.

Pretty common in tanks and ponds. DECCAN: water-holes of the high hill forts of the Western Deccan, *Dalzell & Gibson*; Poona, *Woodrow*!, *Cooke*!—DISTRIB. Throughout the plains of India; Ceylon, Malay and Sandwich Islands.

2. **Potamogeton perfoliatus,** *Linn. Sp. Pl.* (1753) p. 126. Stem stout, terete, slightly branched. Leaves 1–2½ by $\frac{5}{8}$–1 in., sessile, ovate-lanceolate, obtuse, membranous, translucent, amplexicaul, base cordate, 5–9-nerved; stipules small, caducous. Peduncle stout, short, not thickened upwards. Spikes dense-flowered, ¼–$\frac{7}{8}$ in. long. Sepals with long claws, elliptic-obovate. Drupelets $\frac{1}{8}$ in. long, obliquely ovoid, hardly keeled, slightly compressed, with a short usually curved beak. Fl. B. I. v. 6, p. 566; Dalz. & Gibs. p. 248; Reichb. Icon. Fl. Germ. v. 7 (1845) p. 19, t. 29; Syme, Eng. Bot. ed. 3, v. 9 (1869) p. 42, t. 1412; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429.—Flowers: Dec.–Feb.

DECCAN; in the stream round Dapuri garden near Poona, *Dalzell & Gibson*; Poona, *Cooke*!, *Woodrow*! SIND: Jemadar ka Landa near Karachi, *Stocks*, 380!—DISTRIB. India (W. Himalaya, W. Tibet, W. Peninsula); N. temperate regions, Australia.

3. **Potamogeton crispus,** *Linn. Sp. Pl.* (1753) p. 126. Stem branched, compressed. Leaves 1–3 by $\frac{1}{8}$–$\frac{3}{8}$ in., all submerged, semi-amplexicaul, linear or linear-oblong, obtuse, with crisped and finely serrulate margins, 3-nerved, translucent; stipules small, caducous. Peduncle long, often curved, tapering upwards. Spike ¼–⅓ in. long, few-flowered; flowers small. Sepals clawed, $\frac{1}{10}$ in. long including the claw; limb suborbicular. Drupelets obliquely ovoid, $\frac{1}{8}$ in. long, terminated by a slightly recurved compressed beak. Fl. B. I. v. 6, p. 566; Dalz. & Gibs. p. 248; Reichb. Icon. Fl. Germ. v. 7 (1845) p. 18, tt. 29, 30; Syme, Eng. Bot. ed. 3, v. 9 (1869) p. 43, t. 1413; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1123; Watt, Dict. Econ. Prod. v. 6, part 1, p. 331. *Potamogeton tuberosus,* Roxb. Hort. Beng. (1814) p. 12; Grah. Cat. p. 200.

KONKAN: tanks in the Konkans, *Dalzell & Gibson*. DECCAN: Poona, *Woodrow*.—DISTRIB. Plains of India and temperate Himalaya; North and South temperate and subtropical regions.

4. **Potamogeton pectinatus,** *Linn. Sp. Pl.* (1753) p. 127. Stem filiform, copiously distichously branched, forming with the leaves tassel-like masses when taken out of the water. Leaves all submerged, alternate, 1–6 by $\frac{1}{25}$–$\frac{1}{10}$ in., narrowly linear or filiform, acute, opaque, 1–3-nerved or the lower sometimes 5-nerved; stipules adnate to the leaf-sheaths, the tips free. Peduncle with the spike 2–3 in. long, filiform, usually longer than the leaves, not thickened upwards; flowers few in few distant whorls, minute, green. Sepals suborbicular. Drupelets $\frac{1}{8}$–$\frac{1}{6}$ in. long, turgid, dimidiate-obovoid, slightly compressed, shortly beaked, rounded and obscurely 3-keeled on the back, with a very

short straight beak. Fl. B. I. v. 6, p. 567; Dalz. & Gibs. p. 248; Trim. Fl. Ceyl. v. 4, p. 374; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1123.—Flowers: Aug.

Dalzell without locality in Herb. Kew.! DECCAN; Poóna, *Woodrow*. GUJARAT: tank at Gogo (Kathiawad) plentiful, *Dalzell & Gibson*. SIND: Jemadar ka Landa, near Karachi, *Stocks*, 375!; Manchar Lake, *Stocks*!—DISTRIB. Plains of India, the Himalayas, and Western and Eastern Tibet; Ceylon, most regions.

3. **RUPPIA,** Linn.

Submerged plants growing in brackish water; rootstock creeping, much-branched; stems slender, dichotomously branched. Leaves alternate or subopposite, filiform, formed of two parallel tubes; sheath elongate, narrow. Flowers minute, hermaphrodite, 2–6 together within a leaf-sheath on an ultimately elongating straight or spirally coiled peduncle. Perianth 0. Stamens 2; anthers sessile, 2-celled. Carpels 4; ovule solitary in each carpel, pendulous; stigma peltate. Fruit of 4 stipitate ovoid obtuse or beaked achenes. Seed pendulous, uncinate; embryo macropodal.—DISTRIB. Species 2 or 3, temperate and subtropical.

1. **Ruppia rostellata,** *Koch, ex Reichb. Icon. Pl. Crit.* v. 2 (1824) p. 66, t. 174, fig. 306. A submerged aquatic herb growing in brackish water, forming tangled masses of filiform leafy flaccid stems and branches; stems 2 ft. long or more. Leaves filiform, 2–4 in. long, dull olive-green. Peduncles ¼–1 in. long, not spirally coiled. Flowers minute, in pairs, enclosed in a leaf-sheath. Stipes of carpels rapidly lengthening after flowering up to 1 in. long, spreading and forming an umbellate head of achenes. Achenes $\frac{1}{12}$–$\frac{1}{10}$ in. long, beaked; endocarp hard. Fl. B. I. v. 6, p. 568; Reichb. Icon. Fl. Germ. v. 7 (1845) p. 10, t. 17, fig. 25; Trim. Fl. Ceyl. v. 4, p. 374; Syme, Eng. Bot. ed. 3, v. 9 (1869) p. 59, t. 1428; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1124. ? *Zostera marina*, Dalz. & Gibs. Bo. Fl. (1861) p. 277 (*not* of Linn.).

Stocks without locality in Herb. Kew.! KONKAN: Salt-works at Nathay, *Stocks*!; Mahim near Bombay, *Woodrow*.—DISTRIB. Throughout India in brackish water; Ceylon, Temperate Europe and Tropical Asia.

4. **ZANNICHELLIA,** Linn.

Aquatic submerged herbs growing in brackish or fresh water; rootstock slender; stem slender. Leaves linear, with stipular sheaths. Flowers minute, monœcious, both sexes in one membranous sheath. MALE FLOWERS: Perianth 0. Stamen solitary; filament filiform; anther linear, 2–3-celled. FEMALE FLOWERS: Perianth cupular, hyaline. Carpels 2–9, sessile; ovule solitary in each carpel, pendulous, orthotropous; style rather long, slender; stigma oblique, peltate. Fruit of sessile or stipitate subreniformly incurved achenes usually 4 in number. Seed pendulous; testa thin; embryo subcylindric, with the cotyledonary end folded twice on itself.—DISTRIB. Species 4–5, but probably all forms of one species.

1. **Zannichellia palustris,** *Linn. Sp. Pl.* (1753) p. 969. Sub-sp. **pedicellata,** *Syme, Eng. Bot.* ed. 3, v. 9 (1869) p. 57, t. 1426. Stems very slender, filiform. Leaves 1–3 in. long, all submerged, alternate or opposite, narrowly linear or filiform. Flowers minute, subsessile, enclosed in the leaf-sheaths. Filament of the male flowers at first short, afterwards elongating. Peduncles in the Sind specimen (the only specimen from the Bombay Presidency that I have seen) reaching $\frac{1}{16}$ in. long. Achenes distinctly stipitate, about $\frac{1}{8}$ in. long including the beak (which is about half as long as the body of the achene), subreniformly incurved, crested on the back. Fl. B. I. v. 6, p. 568; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1124.

Rare. Deccan: Poona, Mula River, *Woodrow.* Sind: *Dalzell!* Dalzell does not state whether his specimens grew in brackish or fresh water. His specimens merely bear the ticket "*Zannichellia* Scinde."—Distrib. Salt-marshes and less commonly in fresh water, throughout India; most temperate and subtropical regions.

5. **NAIAS,** Linn.

Annual submerged herbs growing in fresh or brackish water; stems rooting from the nodes, branched, filiform, smooth or muricate. Leaves sessile, opposite, alternate or whorled, narrowly linear, sinuate-dentate or serrulate. Flowers minute, axillary, 1-sexual, monœcious (rarely dioecious). Male flowers: Perianth double, the outer tubular or inflated, entire or 4-fid, the inner hyaline. Stamen solitary, adnate to the inner perianth-tube; anther apiculate or cuspidate, usually 4 (rarely 1)-celled. Female flowers: Perianth 0, or hyaline and adnate to the carpel. Carpel solitary, sessile, 1-ovulate; ovule basal, erect, anatropous. Fruit an oblong achene. Seed erect; testa very thin; embryo straight.—Distrib. Throughout the world except in Arctic regions; species 31.

1. **Naias minor,** *All. Fl. Pedem.* v. 2 (1785) p. 221. A small plant, growing in fresh water, $1\frac{3}{4}$–10 in. high; stem slender, much dichotomously branched; internodes short, smooth. Leaves $\frac{3}{8}$–$\frac{7}{8}$ in. long, scarcely $\frac{1}{30}$ in. broad, narrowly linear, the upper recurved, with 6–12 spreading teeth on each margin; sheaths truncate, rounded. Flowers fasciculate, monœcious, the male and female often found in successive leaf-axils. Male flowers about $\frac{1}{16}$ in. long. Anthers 1-celled. Female flowers about $\frac{1}{16}$ in. long. Style long; stigmas 2, unequal. Achenes $\frac{1}{12}$–$\frac{1}{8}$ in. long. Seed narrowly ellipsoid, pitted. Fl. B. I. v. 6, p. 569; Trim. Fl. Ceyl. v. 4, p. 376; Rendle, in Trans. Linn. Soc. ser. 2, v. 5, p. 410 (1899), & in Engler, Pflanzenreich, v. 4, part 12 (1901) p. 14 and p. 2, fig. 1, D–F; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1124. *Naias indica,* Cham. in Linnæa, v. 4 (1829) p. 501; Dalz. & Gibs. p. 277.

Deccan: Poona, *Woodrow.*

This has been included on the authority of Woodrow, who gives Poona as the habitat of the plant. I have seen no specimens from Bombay; there are none in Herb. Kew.—Distrib. More or less throughout India in still fresh water; Ceylon, Old World generally.

Order CXLV. ERIOCAULACEÆ.

Annual or perennial scapigerous marsh (rarely aquatic) herbs. Leaves narrow, with sheathing bases; veins parallel. Flowers 1-sexual, usually monœcious, minute, mostly white, densely aggregated in a solitary globose or hemispheric head at the apex of a peduncle with a tubular basal sheath; heads androgynous (rarely 1-sexual), with an involucre of short 2–many-seriate imbricate scarious or chartaceous bracts, often radiating beyond the circumference of the flowering part of the head; the florets often more or less hoary with short white hairs, and closely packed on a flat, convex, hemispheric, or conical receptacle, each floret solitary in the axil of a cuneiform bract which equals or exceeds its floret, and is usually dorsally hoary near the apex (rarely absent). Corolla usually separated from the calyx by a distinct stipes, sometimes rudimentary, especially in the male flowers (rarely absent). Male flowers: sepals usually 3, free or connate, deciduous (rarely 2 or 0). Petals usually 3, connate in a stipitate funnel-shaped minutely 3-lobed corolla, one lobe sometimes longer than the others. Stamens 6 or fewer, inserted on the corolla; filaments short, often unequal; anthers didymous, 2-celled, usually black. Pistillode 0 or reduced to minute glands. Female flowers sessile or stipitate. Sepals 2–3 (rarely 1 or 0), unequal, usually concave, deciduous. Petals usually 3, unequal, broad or narrow, often ciliate or hairy, frequently with a dark glandular spot on the inner face. Ovary superior, sessile or stipitate, globose, 2–3-celled; ovary solitary in each cell, pendulous; style-branches 2–3, filiform. Fruit a small membranous 2–3-celled loculicidal capsule. Seeds minute, oblong, ellipsoid or globose, smooth, striate, or ribbed; albumen floury; embryo minute.—Distrib. Genera 9, according to Ruhland [Monog. Eriocaul. in Engler, Pflanzenreich, v. 4, part 30 (1903)]; species about 370, in the warmer regions of both hemispheres, most numerous in Tropical America, few in temperate regions.

1. ERIOCAULON, Linn.

Marsh or aquatic herbs; stem usually very short or 0, rarely elongate. Leaves linear, membranous, often fenestrate. Male and female flowers generally mixed in the same, rarely in separate heads. Male flowers: Sepals 2–3, free or often more or less united into a split spathe (rarely absent). Petals 2–3, at the apex of the tube, sometimes with a black gland on the inner face, sometimes rudimentary or absent. Stamens twice as many as the petals or by abortion fewer; anthers 2-celled, usually black. Female flowers: Sepals usually free, mostly unequal, concave, boat-shaped or flattened, often bearded on the apical part or ciliate. Petals 2–3, always free (rarely absent), often with a black gland on the inner face a little below the apex.—Distrib. Warmer parts of both hemispheres in marshy places, North Asia, China, Japan, N. America, Africa, Australia, one species in the British Isles, otherwise absent from Europe; species about 200.

Aquatics; stems elongate, floating, branched.
Leaves capillary, 1-nerved ..... 1. *E. setaceum.*
Leaves linear, 4–7-nerved..... 2. *E. rivulare.*

Terrestrial or marsh plants; stems short or 0.
- Petals of male flowers 3, one much the largest and protruded beyond the floral bracts; involucral bracts orbicular; floral bracts bearded.
  - Receptacle villous; heads snowy-white; anthers black; plant with an odor of chamomile ..... 3. *E. odoratum.*
  - Receptacle glabrous or nearly so; heads white at apex, dark in lower half; anthers white; plant inodorous ..... 4. *E. breviscapum.*
- Petals of male flowers subequal or one rather larger, none produced beyond the floral bracts.
  - Involucral bracts woolly or hairy; receptacle villous.
    - Leaves linear, 3½–8 in. long; peduncles conspicuously 7-ribbed, usually twisted; petals of male flowers unequal ..... 5. *E. Wightianum.*
    - Leaves lanceolate, 1–2½ in. long; peduncles slightly 6-ribbed, scarcely twisted; petals of male flowers subequal ..... 6. *E. lanceolatum.*
  - Involucral and floral bracts both glabrous or nearly so.
    - Receptacle glabrous or nearly so; peduncles glabrous, 5-ribbed ..... 7. *E. Sieboldianum.*
    - Receptacle more or less villous.
      - Plant reaching 8 in. high; peduncles 4-ribbed, hairy ..... 8. *E. stellatulum.*
      - Plant 1–2½ in. high; peduncles obsoletely ribbed, glabrous ..... 9. *E. minutum.*
  - Involucral bracts alone glabrous; floral bracts bearded or pubescent.
    - Peduncles 3–10 in. high.
      - Receptacle sparsely hairy or glabrous.
        - Receptacle sparsely hairy; leaves 4 in. and more long; peduncles 5-ribbed; sepals 3. 10. *E. sexangulare.*
        - Receptacle glabrous; leaves less than 4 in. long; peduncles 7-ribbed; sepals 2 ..... 11. *E. cuspidatum.*
      - Receptacle villous.
        - Seeds closely transversely (microscopically) ridged.
          - Involucral bracts erect or spreading, never reflexed; heads pale grey, hemispheric, with truncate base; floral bracts subacute ..... 12. *E. luzulæfolium.*
          - Involucral bracts at first radiating beyond the head, at length reflexed; heads dark grey, subglobose; floral bracts subacute ..... 13. *E. trilobum.*
        - Seeds smooth, not transversely ridged; involucral bracts reflexed; heads pale grey or snowy white, globosely ovoid; floral bracts acuminate ..... 14. *E. quinquangulare.*
    - Peduncles less than 3 in. high; involucral bracts longer than the flowering part of the head, shining, pale yellow or nearly white ..... 15. *E. Xeranthemum.*

1. **Eriocaulon setaceum,** *Linn. Sp. Pl.* (1753) p. 87. A submerged aquatic; stem 1–3 ft. long, usually simple, stout or slender, densely clothed throughout its length with capillary flexuous glabrous, pellucid, 1-nerved leaves 1½–2 in. long; tips of stems floating. Peduncles numerous, umbellately fasciculate on the apex of the stem, 1½–4 in. high, slender, unequal, glabrous, 6-sulcate, more or less twisted; sheath ¾–1 in. long, obliquely split at the apex, membranous. Heads subglobose, ⅛–⅙ in. in diam., greenish-white, often quite white at the

apex; involucral bracts $\frac{1}{16}$ in. long, broadly obovate or suborbicular, obtuse, concave; floral bracts obovate-cuneate, hairy on the back below the apex, membranous; receptacle villous. MALE FLOWERS: Sepals usually connate into a spathe split open in front. Corolla-tube with 3 small subequal petals at its apex, hairy with white hairs. Stamens 6, the 3 opposite the petals a little larger than the others. FEMALE FLOWERS shortly stipitate. Sepals $\frac{1}{16}$–$\frac{1}{12}$ in. long, obovate-cymbiform, hairy on the back at the apex. Corolla shortly stipitate; petals 3, linear or linear-spathulate, narrow, ciliate with white hairs, usually with a black glandular spot on the inner face below the apex. Ovary 3-lobed; style-branches 3, filiform. Seeds $\frac{1}{60}$ in. long, oblong, smooth, brown. Linn. Fl. Zeyl. (1747) p. 20, n. 50 (*Eriocaulon* without specific name); Rheede, Hort. Mal. v. 12, p. 129, t. 68; Kœrn. in Linnæa, v. 27 (1856) p. 603; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 89. *Eriocaulon Capillus-naiadis*, Hook. f. Fl. B. I. v. 6 (1893) p. 572; Trim. Fl. Ceyl. v. 5, p. 2; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1126.—Flowers: Oct.–Dec.

KONKAN: *Stocks*!, *Dalzell*!, *Woodrow*.—DISTRIB. India (Bengal, Khasia Hills, Birma, W. Peninsula); Ceylon, Cochinchina.

I have followed Ruhland (*l. c.*) in making *E. Capillus-naiadis*, Hook. f., conspecific with *E. setaceum*, Linn. In the 'Flora of British India' (*l. c.*) *E. Capillus-naiadis*, Hook. f., is made conspecific with *E. setaceum* of Kœrnicke, which is certainly that of Linnæus. Ruhland restores *E. intermedium*, Kœrn., which is the *E. setaceum* of many authors, but not of Linnæus.

2. **Eriocaulon rivulare,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 280. Stem simple, elongate, submerged, densely leafy. Leaves linear, flat, all along the stem, somewhat crowded at its apex, 4–9 by $\frac{1}{12}$ in., attenuated into a subulate acumen, dilated at the base, fenestrately 4–7-nerved, opaque, rigid. Peduncles numerous, umbellately fasciculate on the top of the stem, 7–18 in. high, 8–10-sulcate, glabrous, twice as long as the leaves; sheaths tubular, 2–3 in. long, multi-striate, glabrous, shortly split at the apex. Heads globose, reaching $\frac{1}{4}$ in. in diam., snowy-white; involucral bracts $\frac{1}{10}$ in. long, broadly obovate-oblong, lacerate at the apex; floral bracts $\frac{1}{10}$–$\frac{1}{8}$ in. long, oblanceolate-oblong, subacute, hyaline, hairy on the back below the apex; receptacle columnar, hairy. MALE FLOWERS: Sepals 3, all free, $\frac{1}{16}$–$\frac{1}{12}$ in. long, or connate into a spathe split in front. Corolla-tube $\frac{1}{16}$ in. long; petals 3, spathulate, about $\frac{1}{20}$ in. long, subequal, with a black glandular spot, densely hairy. Stamens 6, those opposite the petals the longest; anthers white. FEMALE FLOWERS: Sepals 3, linear, acute, puberulous on the back. Petals 3, linear-spathulate, $\frac{1}{12}$–$\frac{1}{10}$ in. long, obtuse, white, with a black spot below the apex, hairy. Ovary 3-lobed; style-branches 3, filiform. Seeds globose, smooth. Dalz. & Gibs. p. 280; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 91. *Eriocaulon Dalzellii*, Kœrn. in Linnæa, v. 27 (1856) p. 605; Dalz. & Gibs. p. 316; Hook. f. Fl. B. I. v. 6, p. 580; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429.—Flowers: Oct.–Dec.

KONKAN: *Stocks*!; Malwán in streams, *Dalzell*!—DISTRIB. India (W. Peninsula).

The specific name *rivulare* originally given to the plant by Dalzell (1851) was changed into *Dalzellii* by Kœrnicke (*l. c.*) on account of the name *rivulare* having been preoccupied by Don (1849). But Don's plant is now *E. latifolium*, Smith (1809), so that Dalzell's name has been restored.

3. **Eriocaulon odoratum,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 280. Stemless or nearly so. Leaves 1–3 by $\frac{1}{12}$–$\frac{1}{8}$ in., linear-subulate, cæspitose, erect or recurved, fenestrately 6–9-nerved, glabrous, translucent. Peduncles few or many, unequal, 4–8 in. high, slender, glabrous, twisted, 5–6-ribbed; sheaths 1–$2\frac{1}{2}$ in. long, close, obliquely split. Heads subglobose, $\frac{1}{6}$–$\frac{1}{5}$ in. in diam., snowy-villous; involucral bracts $\frac{1}{16}$ in. long, broadly obovate-cuneate, glabrous, at length lacerate at the apex; floral bracts $\frac{1}{16}$ in. long, rhomboid-obovate, cuneate, acuminate, hairy on the upper part of the back with opaque white hairs; receptacle pilose. MALE FLOWERS: Sepals 3, cuneate-oblong, narrow, subobtuse, free or often connate into a spathe split in front, white-hairy on the upper part of the back. Corolla-tube $\frac{1}{12}$ in. long; petals very unequal, hairy, each with a black spot. Anthers black. FEMALE FLOWERS stipitate. Sepals 2, lanceolate, acute, boat-shaped, $\frac{1}{10}$ in. long, pilose. Petals 3, one larger than the other two, $\frac{1}{20}$–$\frac{1}{16}$ in. long, narrow, linear-spathulate, hairy with white opaque hairs and with a black spot on each. Style-branches 3, long, filiform. Fl. B. I. v. 6, p. 574; Dalz. & Gibs. p. 280; Kœrn. in Linnæa, v. 27 (1856) p. 683; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 110.—Flowers: Sept.

KONKAN: *Stocks*!, *Woodrow*; Malwán in stagnant water, *Dalzell*! KANARA: Kulgi (N. Kanara), *Talbot*, 1837!; Karwar, *Talbot*, 2949!; Supa on the Kála naddi, *Talbot*, 2948!—DISTRIB. India (W. Peninsula).

The plant is described by Dalzell as smelling strongly of chamomile.

4. **Eriocaulon breviscapum,** *Kœrn. in Linnæa*, v. 27 (1856) p. 676. Plant 6–15 in. high, growing in still water; root of numerous glabrous slender white fibres; stem almost 0. Leaves cæspitose (? floating), 6–15 by $\frac{1}{8}$–$\frac{1}{5}$ in., linear, subobtuse, glabrous, flat, opaque, conspicuously 7–11-nerved. Peduncles shorter or longer than the leaves, solitary (? or few), 6–8 in. high, glabrous, erect, not or scarcely twisted; sheaths 2–4 in. long, obliquely split. Heads globose or hemispheric, $\frac{1}{4}$–$\frac{3}{8}$ in. in diam., densely white-villous at the apex, the lower portion of the head dark brown; involucral bracts $\frac{1}{12}$ in. long, broadly ovate or obovate, obtuse, glabrous, membranous; floral bracts $\frac{1}{8}$ in. long, linear-oblong, acute, very hairy on the upper part with white hairs. MALE FLOWERS stipitate. Sepals 3, obovate-oblong, obtuse, $\frac{1}{12}$ in. long, slightly unequal, hairy at the top. Corolla-tube $\frac{1}{20}$ in. long; petals slightly unequal, the longest $\frac{1}{16}$ in. long, very hairy, each with a black spot. Stamens 6, those opposite the petals the longest; anthers white or pale yellow. FEMALE FLOWERS very shortly stipitate. Sepals 3, oblong, concave, truncate, $\frac{1}{12}$ in. long, pilose. Petals 3, narrowly linear-spathulate, slightly unequal, the longest $\frac{1}{10}$ in. long, all densely hairy with white hairs and with a black spot. Ovary 3-lobed, shortly stipitate; style-branches 3, filiform. Seeds subglobose, pale yellow, shining. Fl. B. I. v. 6, p. 575; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 70.—Flowers: Dec.–Feb.

Rare. KANARA: Tinai Ghát (2000 ft.), *Talbot*, 1379!; Anmod (N. Kanara), *Talbot*, 1609!—DISTRIB. India (W. Peninsula).

There are only 2 sheets in Herb. Kew., both from N. Kanara.

5. **Eriocaulon Wightianum,** *Mart. in Wall. Pl. As. Rar.* v. 3 (1832) p. 28. Stem short or elongate, often as thick as the thumb. Leaves cæspitose, 3½–8 by ¼–⅝ in., linear, obtuse or subobtuse, glabrous or nearly so, flat, many-nerved, scarcely fenestrate. Peduncles strict, aggregated, 6–15 in. high, conspicuously about 7-ribbed, glabrous or sparsely hairy, usually twisted; sheaths 2–4 in. long, obliquely and deeply split, sparsely hairy, ribbed. Heads ¼–½ in. in diam., globose, densely white-villous; involucral bracts ⅛–⅙ in. long, cuneate-obovate, the outer obtuse, the inner subacute, hairy at the back in the upper part, ultimately reflexed; floral bracts ⅛ in. long, rhomboid-cuneate or obovate-cuneate, acuminate, densely clothed with white hairs in the upper part; receptacle pilose. MALE FLOWERS stipitate. Sepals 3, obovate-oblong, cuneate at the base, free or connate into a spathe, hyaline, the tips pubescent. Corolla-tube $\frac{1}{20}$ in. long; petals all densely hairy at the apex and without a black spot, one slightly larger than the other 2, about $\frac{1}{30}$ in. long. Stamens 6; anthers black. FEMALE FLOWERS sessile or very shortly stipitate. Sepals 3, free, slightly unequal, linear-obovate, bearded towards the tip. Petals $\frac{1}{10}$ in. long, narrowly linear-spathulate, villous with long white hairs and with a minute black spot. Ovary sessile, 3-lobed; style-branches 3, filiform. Seeds about $\frac{1}{50}$ in. long, ellipsoid, dark reddish-brown, smooth, minutely papillose. Fl. B. I. v. 6, p. 576; Wall. Cat. 6067; Kœrn. in Linnæa, v. 27 (1856) p. 658; Trim. Fl. Ceyl. v. 5, p. 8; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 75.—Flowers: Oct.–Nov.

Dalzell without locality in Herb. Kew. KONKAN: *Stocks*! KANARA: Falls of Gairsoppa, *Talbot*, 771!—DISTRIB. India (Birma, W. Peninsula); Ceylon.

6. **Eriocaulon lanceolatum,** *Miq. ex Steud. Syn. Pl. Cyp.* part 2 (1855) p. 271. Plant 4–8 in. high; stem very short. Leaves cæspitose, erect, 1–2½ by ¼–½ in., oblong-lanceolate, subacute, glabrous, thinly membranous, translucent, many-nerved. Peduncles few, 3–8 in. high, slender, slightly 6-ribbed, scarcely twisted, glabrous; sheaths lax, 1–2¼ in. long, obliquely split, glabrous. Heads subglobose, white-villous; involucral bracts $\frac{1}{16}$ in. long, broadly obovate or quadrate, obtuse, scarious, not reflexed, hairy on the back in the upper part, ciliate at the apex; floral bracts cuneate-oblong, obtuse, hairy on the back; receptacle villous. MALE FLOWERS: Sepals 3, boat-shaped, $\frac{1}{20}$–$\frac{1}{16}$ in. long. Corolla-tube $\frac{1}{30}$ in. long; petals 3, minute, subequal, each with a black spot. Stamens 6; anthers black. FEMALE FLOWERS sessile. Sepals 3, of which 2 are deeply boat-shaped, $\frac{1}{10}$–⅛ in. long, the other flat, one of the sepals sometimes winged at the back. Petals 3, unequal, $\frac{1}{10}$ in. long, linear-lanceolate, acute, with a small spot, pubescent. Ovary deeply 3-lobed; style-branches 3, slender. Seeds $\frac{1}{30}$ in. long, slightly ribbed, broadly oblong, reddish-brown. Fl. B. I. v. 6, p. 577; Kœrn. in Linnæa, v. 27 (1856) p. 656; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 78.—Flowers: Oct.–Nov.

Rare. KONKAN: *Stocks*! KANARA: Supa, *Talbot*, 2947!—DISTRIB. India (W. Peninsula).

7. **Eriocaulon Sieboldianum** (*Sieboldtianum*), *Sieb. & Zucc. ex Steud. Syn. Pl. Cyp.* part 2 (1855) p. 272. A low stemless tufted

annual scarcely reaching 6 in. high. Leaves 1-2½ by $\frac{1}{30}$-$\frac{1}{10}$ in., narrowly linear, subulate, glabrous, opaque or translucent, few-nerved. Peduncles numerous, aggregated, glabrous, 3–6 in. high, slender, 5-ribbed; sheaths $\frac{1}{5}$–1 in. long, obliquely split, glabrous, shorter than the leaves. Heads small, $\frac{1}{8}$-$\frac{1}{5}$ in. in diam., whitish or purplish, globose or ovoid; involucral bracts $\frac{1}{10}$-$\frac{1}{8}$ in. long, the outer oblong, obtuse, the tip often lacerate, the inner narrower, all scarious, spreading or ascending, glabrous, pale; floral bracts $\frac{1}{10}$-$\frac{1}{8}$ in. long, linear-oblong or oblong-lanceolate, obtuse or subacute, closely imbricating, hyaline, glabrous, shining, often with a broad central purplish band; receptacle columnar, glabrous or nearly so. MALE FLOWERS stipitate. Sepals connate into a glabrous cucullate spathe, split in front, 3-toothed at the apex. Corolla-tube $\frac{1}{30}$ in. long; petals minute, narrow, subequal. Stamens 6; anthers rotund, white. FEMALE FLOWERS stipitate. Sepals usually 2, free, narrowly linear, acute, hyaline, glabrous, deciduous. Petals 0. Ovary stipitate, the stipes with a node at the position of the petals, 3-lobed; style-branches 3, filiform. Seeds about $\frac{1}{60}$ in. long, ellipsoid, smooth, reddish-brown, shining. Fl. B. I. v. 6, p. 577; Trim. Fl. Ceyl. v. 5, p. 10; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 111; Prain, Beng. Pl. p. 1126. *Eriocaulon sexangulare*, Mart. in Wall. Pl. As. Rar. v. 3 (1832) p. 28 (*not* of Linn.); Grah. Cat. p. 231; Dalz. & Gibs. p. 279; Kœrn. in Linnæa, v. 27 (1856) p. 613.—Flowers: Sept.

Rare. KONKAN: *Stocks*! KANARA: Karwar, *Talbot*, 1290!—DISTRIB. Throughout India; Ceylon, China, Japan.

8. **Eriocaulon stellatulum,** *Kœrn. in Linnæa*, v. 27 (1856) p. 620. Plant reaching 8 in. high; stem scarcely any. Leaves 1–3 by $\frac{1}{4}$-$\frac{1}{2}$ in., broadly linear, subacute, tapering from the base to the tip, many-nerved, flat, glabrous, membranous. Peduncles 2–8 in. high, slender, 4-sulcate, hairy with spreading hairs; sheaths 1–1½ in. long, obliquely split, with a long acuminate tip, glabrous or slightly hairy near the base. Heads $\frac{1}{4}$-$\frac{1}{3}$ in. in diam., globose, stellately echinulate from the long spreading bracts, glabrous, white; involucral bracts $\frac{1}{5}$-$\frac{1}{6}$ long, ovate, acuminate, scarious, glabrous, at length reflexed; floral-bracts $\frac{1}{6}$-$\frac{1}{5}$ in. long, narrowly lanceolate, hyaline, glabrous, stellately spreading, much exceeding the flowers; receptacle pilose. MALE FLOWERS scarcely stipitate. Sepals 2, free or connate, $\frac{1}{16}$-$\frac{1}{12}$ in. long, obliquely obovate, acute, glabrous, hyaline. Corolla-tube scarcely $\frac{1}{20}$ in. long; petals minute, subequal, with a dark spot. Stamens 6; anthers black. FEMALE FLOWERS sessile. Sepals 3, falcately ovate, $\frac{1}{10}$ in. long, with a long subulate ultimately recurved acumen, dorsally crenately winged, glabrous, white. Petals 3, linear-spathulate, $\frac{1}{20}$ in. long, obtuse, hairy, usually with a black spot. Ovary sessile, 3-lobed; style-branches 3, filiform. Seeds $\frac{1}{30}$ in. long, globosely ellipsoid, smooth, shining, chestnut-brown. Fl. B. I. v. 6, p. 579; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 97.—Flowers: Feb.

KONKAN: *Stocks*! KANARA: Darsinguda (3200 ft.), *Talbot*, 1598!—DISTRIB. India (W. Peninsula).

9. **Eriocaulon minutum,** *Hook. f. Fl. B. I.* v. 6 (1893) p. 579. A small densely tufted herb 1–2½ in. high. Leaves ½-¾ in. long, subulate

or filiform, acute or obtuse, compressed, opaque, 3–5-nerved, base dilated and sparsely woolly within. Peduncles 1–2½ in. high, capillary, flexuous, numerous, aggregated, obsoletely ribbed, slender, glabrous, slightly twisted; sheaths rather lax, ¼–⅜ in. long, obliquely split. Heads $\frac{1}{10}$ in. in diam., white, shining, glabrous; involucral bracts $\frac{1}{10}$ in. long, erect, ovate-lanceolate, acuminate; floral bracts shorter, oblanceolate, acute or cuspidate; receptacle small, columnar, glabrous or sparsely villous. MALE FLOWERS: Sepals connate into a spathe split in front, irregularly 3-toothed, pale, glabrous. Petals minute, almost 0. Stamens 3–6; anthers black. FEMALE FLOWERS subsessile. Sepals 2, with rarely a filiform third one, boat-shaped, concave, falcately curved, acute, winged or keeled on the back, glabrous, the keel or wing spinulose. Petals 0. Ovary 2–3-lobed, subsessile; style-branches 3, very short. Seeds oblong. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 111.

Rare. KONKAN: *Stocks*!—DISTRIB. India (W. Peninsula).

10. **Eriocaulon sexangulare,** *Linn. Sp. Pl.* (1753) p. 87. A tall stout herb; stem as thick as the little finger or less, short (rarely elongate). Leaves erect, cæspitose, 4–12 in. long by ¼–¾ in. wide at the base, linear, narrowed from the base to the subacute or acuminate tip, thin, many-nerved, opaque, drying brown. Peduncles many, stiff, up to 18 in. high, 5-ribbed, more or less twisted; sheaths 3–6 in. long, obliquely split, herbaceous, with a long green acumen. Heads ⅛–⅜ in. in diam., globose, hemispherical or cylindric-ovoid (sometimes viviparous), hard, hoary, with truncate base; bracts imbricate, closely appressed, concealing the flowers, those of the involucre ⅛ in. long, subquadrate, orbicular or obovate, acute, glabrous, yellow, shining, the floral bracts ⅛ in. long, cuneate-obovate, with a sudden short triangular acumination; receptacle globose, columnar or hemispheric, sparsely hairy. MALE FLOWERS quite flat. Sepals free or connate, $\frac{1}{12}$ in. long, boat-shaped, winged, glabrous. Corolla-tube $\frac{1}{20}$ in. long; petals minute, triangular, ciliate, usually with a small black spot. Stamens 6; anthers black. FEMALE FLOWERS sessile. Sepals 3, free, 2 of which are large, boat-shaped, acute, $\frac{1}{10}$–⅛ in. long, dorsally broadly winged, the third small, linear, flat, all glabrous. Petals filiform, terminated by a pencil of long hairs. Ovary subsessile; style-branches 3, filiform. Seeds subglobose, ribbed, the ridges papillose. Fl. B. I. v. 6, p. 580; Trim. Fl. Ceyl. v. 5, p. 5; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 110. *Eriocaulon Wallichianum,* Mart. in Wall. Pl. As. Rar. v. 3 (1832) p. 27, t. 249; Kœrn. in Linnæa, v. 27 (1856) p. 687; Dalz. & Gibs. p. 280.—Flowers: Sept.

KONKAN: *Stocks*!, *Dalzell*!, *Woodrow*; W. Ghâts, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon, Tropical Asia, Madagascar.

11. **Eriocaulon cuspidatum,** *Dalz. in Kew Journ. Bot.* v. 3 (1851) p. 281. Stemless. Leaves cæspitose, erect, 1–3½ by ⅛–¼ in., linear-oblong, rounded and cuspidate at the apex, glabrous, translucent, fenestrately 7–9-nerved. Peduncles 6–12 in. high, fasciculate, few or many, 7-sulcate; sheaths reaching sometimes 4 in. long, obliquely split, glabrous. Heads ⅙–¼ in. in diam., hemispheric or subglobose, white-puberulous; involucral bracts $\frac{1}{10}$ in. long, broadly obovate-cuneate,

obtuse, concave, glabrous; floral bracts similar; receptacle glabrous. MALE FLOWERS: Sepals 2, free, $\frac{1}{16}$ in. long, obovate-lanceolate, acute, deeply concave, hyaline, slightly winged and puberulous on the back. Corolla-tube $\frac{1}{16}$ in. long; petals small, unequal, with a conspicuous black spot, hairy. Stamens 6; anthers black. FEMALE FLOWERS: Sepals 2, elliptic-lanceolate, acute, $\frac{1}{12}$–$\frac{1}{10}$ in. long with a pubescent rounded crest-like wing on the back. Petals 3, unequal, narrowly linear-lanceolate, fimbriately villous towards the tip and with a conspicuous black spot. Ovary 3-lobed; style-branches 3, filiform. Seeds oblong, quite smooth. Fl. B. I. v. 6, p. 581; Dalz. & Gibs. p. 280; Kœrn. in Linnæa, v. 27 (1856) p. 684; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 104; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429.—Flowers: Nov.

KONKAN: *Stocks*!, *Law*!, *Dalzell*!; between Vingorla and Malwán, *Dalzell*! KANARA: Siddapur in rice-fields, *Talbot*, 1083!—DISTRIB. India (W. Peninsula).

12. **Eriocaulon luzulæfolium,** *Mart. in Wall. Pl. As. Rar.* v. 3 (1832) p. 28. A herb 4–10 in. high; stems stout or slender, sometimes as thick as a swan's quill, with many fibrous glabrous whitish roots. Leaves cæspitose, 1–3 by $\frac{1}{16}$–$\frac{1}{8}$ in. in the middle, linear-lanceolate, narrowed from the base to the tip, subacute, glabrous, flat, opaque or translucent, fenestrately 10–12-nerved near the base. Peduncles 3–10 in. high, numerous, erect, glabrous, 5-sulcate, twisted; sheaths 1–2 in. long, obliquely split, at length lacerate at the mouth, glabrous, more or less striate. Heads $\frac{1}{8}$–$\frac{1}{5}$ in. in diam., hemispheric, hard, pale grey, pubescent, base truncate; involucral bracts about $\frac{1}{10}$ in. long, conspicuous, oblong-obovate, cuneate, obtuse, concave, subcoriaceous, glabrous, shining, never reflexed; floral bracts narrower, $\frac{1}{10}$ in. long, spathulate-oblong, subacute, shortly pubescent at the apex; receptacle conical or columnar, villous with long hairs. MALE FLOWERS stipitate. Sepals 3, oblong-obovate, concave, $\frac{1}{20}$–$\frac{1}{16}$ in. long, obtuse or subacute, ciliate at the tips, free or two connate. Corolla-tube about $\frac{1}{20}$ in. long; petals minute, equal, without a glandular spot. Stamens 6; anthers black. FEMALE FLOWERS shortly stipitate. Sepals 3, linear-oblong, falcate, concave, acute, dorsally tipped with bristly hairs. Petals 3, linear-lanceolate, $\frac{1}{12}$ in. long, ciliate, without a glandular spot. Ovary subsessile, 3-lobed; style-branches 3, filiform. Seeds ellipsoid, orange-yellow, faintly ribbed and very closely microscopically transversely ridged. Fl. B. I. v. 6, p. 582; Trim. Fl. Ceyl. v. 5, p. 7; Kœrn. in Linnæa, v. 27 (1856) p. 636; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1126; Ruhl. in Engler, Pflanzenreich, v. 4, part 30, p. 88.

KONKAN: *Stocks*!—DISTRIB. Throughout India; Ceylon.

13. **Eriocaulon trilobum,** *Buch.-Ham. in Wall. Cat.* (1828) 6072, D. A stemless herb of rice-fields and wet places. Leaves erect, cæspitose, green, $1\frac{3}{4}$–$4\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{4}$ in., linear, narrowed towards an acute or subobtuse apex, glabrous, flat, fenestrately 9–11-nerved, not drying red. Peduncles numerous, 3–8 in. high, glabrous, 5–6-ribbed, twisted; sheaths $\frac{3}{4}$–2 in. long, obliquely split, somewhat lax, striatulate. Heads $\frac{1}{8}$–$\frac{1}{5}$ in. in diam., subglobose, dark grey; involucral bracts $\frac{1}{8}$ by $\frac{1}{20}$ in., linear-oblong, obtuse, glabrous, at first radiating beyond the head,

afterwards reflexed, pale, shining; floral bracts $\frac{1}{12}$ in. long, cuneate-obovate, obtuse or subacute, not acuminate, ciliate at the apex, concave; receptacle villous. MALE FLOWERS shortly stipitate. Sepals 3, oblong, obtuse, $\frac{1}{16}$ in. long, connate into a spathe, glabrous. Corolla-tube $\frac{1}{25}$ in. long; petals minute. Stamens 6; anthers black. FEMALE FLOWERS subsessile. Sepals 3, oblanceolate, boat-shaped, $\frac{1}{16}$ in. long, hairy on the back. Petals 3, free, narrowly spathulate, hairy above and with a black spot. Ovary subsessile, 3-lobed; style-branches 3, filiform. Seeds about $\frac{1}{60}$ in. long, ellipsoid, microscopically closely transversely ridged, pale yellow. Fl. B. I. v. 6, p. 583; Kœrn. in Linnæa, v. 27 (1856) p. 645; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1127 Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 74. *Eriocaulon Sollyanum*, Royle, Illustr. (1839) p. 409, t. 97, fig. 1. Seems scarcely to differ from *E. infaustum*, N. E. Brown, in Dyer, Fl. Trop. Africa, v. 8 (1902) p. 253.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks*!, *Law*! SIND: *Stocks*! —DISTRIB. Throughout India.

14. **Eriocaulon quinquangulare,** *Linn. Sp. Pl.* (1753) p. 87. Stems very short. Leaves 1–4 by $\frac{1}{10}$–$\frac{1}{3}$ in., linear, attenuated towards the apex, acute or acuminate, glabrous, flat, membranous, fenestrately 5–11-nerved, opaque or subtranslucent, green above, often purplish beneath, frequently drying red. Peduncles many, 3–9 in. high, glabrous, 5-ribbed, scarcely twisted; sheaths 1–2¼ in. long, obliquely split, glabrous, often purplish. Heads globosely ovoid, $\frac{1}{6}$–$\frac{1}{4}$ in. in diam., grey or snow-white; involucral bracts $\frac{1}{12}$ in. long, linear-oblong or obovate-oblong, subcuneate at the base, very obtuse, scarious, glistening, at length reflexed and concealed under the head; floral bracts $\frac{1}{10}$ in. long, subrhomboid or oblanceolate, acuminate, dorsally hairy, base cuneate; receptacle globose or columnar, sparsely villous. MALE FLOWERS: Sepals 3, all or 2 only connate into a spathe, $\frac{1}{16}$ in. long, oblong-spathulate, obtuse, penicillate at the tips. Corolla-tube about $\frac{1}{20}$ in. long; petals minute, pilose. Stamens 6; anthers black. FEMALE FLOWERS stipitate. Sepals 3, free, $\frac{1}{16}$ in. long, narrowly linear-spathulate, obtuse, pilose towards the apex, white. Petals 3, free, $\frac{1}{20}$ in. long, linear-spathulate, villous, usually with a black spot. Ovary stipitate or subsessile, 3-lobed; style-branches 3, long, filiform. Seeds $\frac{1}{50}$ in. long, ellipsoid or subglobose, pale yellow, quite smooth. Fl. B. I. v. 6, p. 582; Grah. Cat. p. 230; Dalz. & Gibs. p. 280; Kœrn. in Linnæa, v. 27 (1856) p. 641; Trim. Fl. Ceyl. v. 5, p. 9; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 85; Prain, Beng. Pl. p. 1127; Linn. Fl. Zeyl. (1747) n. 48 (*Eriocaulon* without specific name).

Stocks without locality in Herb. Kew.! KONKAN: Salsette, in rice-fields, frequent, *Jacquemont*, 742!—DISTRIB. Throughout India; Ceylon.

15. **Eriocaulon Xeranthemum,** *Mart. in Wall. Pl. As. Rar.* v. 3 (1832) p. 29. A small stemless plant 1–2½ in. high. Leaves cæspitose, ¾–1½ by $\frac{1}{16}$–$\frac{1}{8}$ in., linear-lanceolate, acute or acuminate, flat, glabrous, translucent, fenestrately 7–11-nerved, often recurved. Peduncles ½–2½ in. high, few or many, stout, striate, more or less twisted; sheaths reaching 1 in. long, obliquely split, glabrous. Heads (including the involucral bracts) $\frac{1}{6}$–$\frac{1}{5}$ in. long; involucral bracts longer than the

flowering part of the head, lanceolate, acuminate, glabrous, glistening, scarious, pale yellow or nearly white; floral bracts $\frac{1}{10}$–$\frac{1}{8}$ in. long, oblong-obovate, obtuse, cuneate at the base, hairy at the apex. Receptacle glabrous or nearly so. MALE FLOWERS subsessile. Sepals $\frac{1}{20}$ in. long, obovate-cuneate, obtuse or truncate, hairy at the apex, free or all or 2 connate into a spathe split in front. Corolla-tube short; petals minute, glabrous. Stamens 6; anthers yellow (*Dalzell*). FEMALE FLOWERS subsessile. Sepals 2 (rarely 3, the third capillary), $\frac{1}{20}$–$\frac{1}{16}$ in. long, unequal, lanceolate, narrower than the male sepals, hairy at the tip. Petals $\frac{1}{20}$ in. long, linear or oblanceolate, hairy at the tip and with a minute glandular spot which is yellow (*fide* Dalzell). Ovary sessile, 3-lobed; style-branches 3, filiform. Seeds narrowly oblong, yellow, papillose. Fl. B. I. v. 6, p. 584; Kœrn. in Linnæa, v. 27 (1856) p. 624; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 429; Prain, Beng. Pl. p. 1127; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 96. *Eriocaulon pygmæum*, Dalz. in Kew Journ. Bot. v. 3 (1851) p. 281; Dalz. & Gibs. p. 280.

KONKAN: *Stocks*!; near Malwán in marshy places, *Dalzell*. KANARA: Karwar, *Talbot*, 2945!—DISTRIB. Throughout India.

IMPERFECTLY KNOWN SPECIES.

ERIOCAULON BOMBAYANUM, Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 104. Stem very short. Leaves linear-lanceolate, acute, $\frac{1}{2}$–$\frac{3}{4}$ by $\frac{1}{12}$–$\frac{1}{10}$ in. Peduncles many, 3½–4 in. high; sheaths as long as the leaves. Heads globose or globosely cylindric, densely snowy-puberulous; involucral bracts always conspicuous, lanceolate or oblong-obovate, acute, green, glabrous; floral bracts oblong-obovate, acute, ciliate, dark-colored. Flowers heteromerous. MALE FLOWERS: Sepals 2, connate into a spathe to the apex, ciliate, obtuse, olive-green. Petals 3, very small, glandular. Stamens 6; anthers black. FEMALE FLOWERS: Sepals 2, linear, winged or keeled, acute, concave, dark-colored, ciliate. Petals 3, linear-oblanceolate, with a glandular spot, ciliate, white. Ovary 3-lobed. The above is Ruhland's description.

KONKAN: Bombay, *Warburg*, 867, in Herb. Berol. ex Ruhland. I have seen no specimens; there are none in Herb. Kew.

ERIOCAULON RITCHIEANUM, Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 73. Stem very short. Leaves 1½–2½ by $\frac{1}{20}$ in., linear. Peduncle solitary, about 6½ in. high, scarcely twisted; sheaths lax, glabrous, 1½ in. long. Heads subglobose, white-villous at the top, ¼–½ in. in diam.; involucral bracts obovate, obtuse, glabrous; floral bracts similar, acute, greyish-yellow puberulous on the back near the apex. MALE FLOWERS: Sepals connate into a spathe, very obtuse. Petals small, with a gland. Anthers white. FEMALE FLOWERS: Sepals ovate, acute, free, lax, grey-green, puberulous on the back. Petals oblong-spathulate, white, subobtuse, with a gland. Ovary 3-lobed. The above is Ruhland's description.

S. M. COUNTRY: Belgaum, *Ritchie*, 1248, in Herb. Boiss.-Barb. I have seen no specimens; there are none in Herb. Kew.

ERIOCAULON ROBUSTO-BROWNIANUM, Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 77. Stem very short. Leaves cæspitose, lanceolate, very obtuse, fenestrate at the base, glabrous, 8–10 in. long by 1 in. broad at the base. Peduncles numerous, twisted, subrobust, 12–16 in. high; sheaths rather loose, obliquely split, 3½–4½ in. long. Heads globose, snowy-white, puberulous, nearly ½ in. in diam.; involucral bracts broadly obovate, the exterior obtuse, the inner acute, pale straw-colored, puberulous at the back near the apex, then glabrous, at length concealed by the flowers; floral bracts obovate, acuminate, rather rigid, greyish-white, a little longer than the flowers. Flowers trimerous. MALE FLOWERS: Sepals spathaceo-connate,

obtuse, ciliate, gland-bearing. Anthers black. FEMALE FLOWERS: Sepals obovate, acute, keeled, ciliate, grey, subequal. Petals narrowly oblong, gland-bearing, ciliate. The above is Ruhland's description.

KANARA: Dharwar and Bellary district (*Saw.* according to Ruhland, but probably a misprint for *Law*). I have seen no specimens; there are none in Herb. Kew.

ERIOCAULON ROUXIANUM, Steud. Syn. Pl. Cyp. part 2 (1855) p. 270. Stemless. Leaves 1–1½ in. long from a broad base, linear-lanceolate, subobtuse, 9–11-nerved, subpellucid, twice as long as the tumid sheaths, which are whitish, submembranous, entire or 2-fid at the apex. Heads ½ in. in diam., snowy-villous; involucral bracts longer than the heads, herbaceous, erect, linear-oblong, obtuse, entire; floral bracts ovate, subobtuse, ciliate at the apex. Kœrn. in Linnæa, v. 27 (1856) p. 626; Dalz. & Gibs. p. 316; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 116. Collected in Bombay by Polydore Roux (*fide* Steudel). Kœrnicke, who has not seen any specimens, considers the species somewhat doubtful and, as far as may be judged from the meagre description, to approach near to *E. Thwaitesii*, an identification which Ruhland considers doubtful.

Dalzell, who has collected and described many of the Bombay Eriocaulons, has seen neither this plant nor *E. heterolepis*. There are no specimens in Herb. Kew. Roux's specimens, collected in Bombay in 1832, are said to be in Delessert's Herbarium (Lasegue, in Deless. Mus. Bot. (1845) p. 156).

EXCLUDED SPECIES.

ERIOCAULON HETEROLEPIS, Steud. Syn. Pl. Cyp. part 2 (1855) p. 271. Stemless, tufted. Leaves lanceolate from a broad base, subobtuse. Involucral bracts 2-seriate, scarious, the exterior oblong-lanceolate, deciduous, the interior ovate, obtuse, much shorter than the head; floral bracts cuneate-ovate. Sepals linear, ciliate at the apex. Fl. B. I. v. 6, p. 585; Kœrn. in Linnæa, v. 27 (1856) p. 652; Dalz. & Gibs. p. 316; Ruhl. in Engler, Pflanzenreich, v. 4, part 30, p. 74.

Plant collected by Polydore Roux near Bombay (*fide* Steudel). The species depends altogether on the description by Steudel, who may or may not have had Roux's specimens. Kœrnicke states (*l. c.*) that he has seen no specimens of the plant and considers the species a very doubtful one which may have been described under another name, but, curiously enough, he has made a *variety* to this doubtful species in Miq. Ann. Mus. Lugd. Bat. v. 3 (1867) p. 239, which he names var. *nigricans*, a Java plant, which he fully describes. Ruhland (*l. c.*) copies Kœrnicke's description of the Java plant (var. *nigricans*), and assigns it to *E. heterolepis* as a typical description of that species.

ERIOCAULON EURYPEPLON, Kœrn. in Linnæa, v. 27 (1856) p. 685; Hook. f. Fl. B. I. v. 6, p. 585; Ruhl. in Engler, Pflanzenreich, v. 4, part 30 (1903) p. 104.

Kœrnicke gives "East Indies" as the habitat of the plant which is stated to have been collected by Huegel no. 1886 (Hb. Vindob. et Zuccarini), no precise locality having been mentioned. Ruhland (*l. c.*) gives East Indies, Malabar, Konkan, &c. as the habitat, and Stocks, Huegel, &c. as the collectors, but there is no mention of the whereabouts of the specimens said to have been collected by Stocks. None of these are to be found in Herb. Kew., and as Stocks almost invariably sent his collections to the Kew Herbarium, I think it probable that Ruhland has made a mistake in his citation. There is, as far as I know, no evidence of the existence of the species in the Bombay Presidency.

ORDER CXLVI. CYPERACEÆ.

Perennial (rarely annual) herbs with the habit of grasses; roots fibrous; stem terete or 3-angled, usually simple. Leaves grass-like, (rarely 0), 3-ranked, mostly crowded at the base of the stem (the upper fewer), with tubular sheaths which are more or less closed or the lower split to the base; ligule 0 or a short prolongation of the mouth of the

sheath opposite to the blade. Inflorescence of solitary, fasciculate, paniculate or spicate spikelets, composed of small distichously or spirally imbricate scales (glumes); flowers minute, 1–2-sexual, in the axils of the glumes. Perianth 0, or of 2 or more hypogynous bristles or scales (ovary enclosed in a utricle in *Carex*). Stamens 1–3; filaments flattened; anthers basifixed, linear. Ovary 1-celled; ovule solitary, basal, erect, anatropous; style short or long; stigmas 2–3. Fruit a compressed or trigonous nut. Seed erect, free; embryo minute, within the base of the floury albumen.—DISTRIB. Genera about 65; species about 3000, universally distributed.

Nut not enclosed in a utricle.
- Flowers 2-sexual, solitary in the glumes of a simple spikelet.
  - Flowering glumes all distichous.
    - Fruit-bearing glumes not winged on the keel.
      - Spikelets many-flowered ..... 1. CYPERUS.
      - Spikelets 1–2-flowered ..... 2. KYLLINGA.
    - Fruit-bearing glumes with winged keels ..... 3. COURTOISIA.
  - Flowering glumes all spirally imbricate or the lower only distichous.
    - Spikelets many-flowered.
      - Hypogynous bristles or scales 0.
        - Style-base swollen, disarticulating from the nut ..... 4. FIMBRISTYLIS.
        - Style-base persistent, leaving a tumour on the nut ..... 5. STENOPHYLLUS.
      - Hypogynous bristles or scales present.
        - Nut with hypogynous bristles.
          - Style-base swollen ..... 6. ELEOCHARIS.
          - Style-base not swollen ..... 7. SCIRPUS.
        - Nut with hypogynous scales.
          - Hypogynous scales 6, divided to the base into linear segments; stigmas 3..... 8. ERIOPHORUM.
          - Hypogynous scales not divided into segments.
            - Hypogynous scales 6 or 3 or 0, petal-like; stigmas 3..... 9. FUIRENA.
            - Hypogynous scales 2, lateral, bracteole-like; stigmas 2 ... 10. HYPOLYTRUM.
    - Spikelets few-flowered.
      - Stigmas 2 ..... 11. RHYNCHOSPORA.
      - Stigmas 3 ..... 12. REMIREA.
  - Flowers 1-sexual; nut stipitate, bony; scales or bristles 0. 13. SCLERIA.

Nut enclosed in a bottle-shaped utricle with an entire or notched or shortly slit mouth ..... 14. CAREX.

1. CYPERUS, Linn.

Perennial (rarely annual) glabrous herbs; rhizome creeping, short or long or 0. Leaves mostly towards the base of the stem, occasionally reduced to sheaths. Spikelets in solitary globose or umbellate heads or spikes; involucral bracts 1 or more, foliaceous; bracteoles under the secondary divisions of the inflorescence; rhachilla usually persistent, not or in a few species disarticulating towards the base, sometimes with membranous wings derived from the persistent glume-bases. Glumes distichous, the 2 lowest empty, those above 2-sexual, all nearly equal, deciduous from below upwards, the uppermost 1–3 sterile or empty; hypogynous scales or bristles 0. Stamens 1–3; anthers linear or oblong.

Ovary compressed; style short or long or obsolete; stigmas 2 or 3. Fruit trigonous, triquetrous, obovoid, or plano-convex.—DISTRIB. All warm and temperate regions; species about 360.

I have followed Boeckeler in including under the genus *Cyperus* the genera *Pycreus*, *Juncellus*, and *Mariscus*, a course followed by Pax (Engl. & Prantl, Pflanzenf.). The late Dr. Trimen in his 'Flora of Ceylon' continued by Sir Joseph Hooker includes the first two genera in *Cyperus*, but retains *Mariscus* as a distinct genus. The generic distinction in that genus, however, viz. the disarticulation of the rhachilla of the spikelets above the 2 lowest glumes, cannot be applied in the field, but may be said to be limited to herbarium specimens. In a recently published pamphlet by Dr. N. L. Britton, Director-in-Chief of the New York Botanical Gardens, "The Sedges of Jamaica" [Bulletin of the Department of Agriculture of Jamaica, vol. 5, Supplement 1 (1907)], that botanist makes the following remarks on page 1:—"I have accepted the generic limits outlined by Mr. Clarke with the exception of his treatment of *Cyperus* and its segregates, where I have accepted the view of previous authors in taking *Cyperus* in its broad sense rather than recognizing the genera *Pycreus*, *Mariscus*, and *Torulinium*, as I believe the characters depended on by Mr. Clarke for the maintenance of these genera are too vague for satisfactory use."

Stigmas 2.
- Fruit a laterally compressed nut.
  - Superficial cells of the nut longitudinally oblong or elliptic. Nut often appearing zonate or muricate by reason of the thickened ends of the cells running into an undulating or broken horizontal line.
    - Spikelets lanceolate, 20–60-flowered; nut obovoid black ..... 1. *C. latespicatus.*
    - Spikelets linear-oblong with exactly parallel sides, 20-flowered; nut globosely ovoid, brown ..... 2. *C. malabaricus.*
  - Superficial cells of the nut nearly square. Nut often appearing regularly dotted by reason of the light reflected from the convex surface of each cell.
    - Stems often clothed for $\frac{1}{4}$–$\frac{3}{4}$ of their length by leaf-sheaths, decumbent at the base; rhizome creeping, 4–10 in. long ..... 3. *C. sanguinolentus.*
    - Stems enveloped in leaf-sheaths only a little way above the base, erect; roots fibrous.
      - Annuals.
        - Stems tufted.
          - Spikelets 6–10-flowered; rhachilla winged; stamens 2–3 ..... 4. *C. hyalinus.*
          - Spikelets 20–50-flowered; rhachilla not winged.
            - Stamen 1; nut $\frac{1}{10}$ in. long ..... 5. *C. pumilus.*
            - Stamens 2; nut $\frac{1}{20}$ in. long ..... 6. *C. globosus.*
        - Stem robust, solitary or subsolitary.
          - Nut $\frac{1}{10}$ in. long, rounded at the apex; glumes with conspicuous white margins; bracts reaching 16 in. long; stamens usually 3 ..... 7. *C. albomarginatus.*
          - Nut $\frac{1}{15}$ in. long, obcordate at the apex; margins of glumes not conspicuously white; bracts reaching 9 or 10 in. long; stamens 3 ..... 8. *C. puncticulatus.*
      - Perennial; nut $\frac{1}{20}$ in. long; stamens usually 2. 9. *C. odoratus.*
- Fruit a dorsally compressed nut.
  - Spikelets many, densely packed in a terminal head; stems reaching 10 in. long; bracts 1–6 in. long; a dwarf annual herb ..... 10. *C. pygmæus.*
  - Spikelets 1–30 in 1 apparently lateral head; stems reaching 2 ft. long; bracts 1–3 in. long ..... 11. *C. lævigatus.*
  - Spikes umbellate; stems reaching 3 ft. long; bracts reaching 18 in. long; a stout perennial herb ..... 12. *C. alopecuroides.*

Stigmas 3; fruit a trigonous or triquetrous nut.
Rhachilla of spikelets persistent.
Inflorescence usually umbellate, rarely capitate.
Spikelets digitate or clustered, not spicate or racemose.
Annuals (except *C. Haspan*).
Glumes mucronate.
Nut $\frac{1}{10}$ in. long.
Nut oblong, pale brown or yellow; style shorter than the nut; stamens 1–2; margins of glumes hyaline ..... 13. *C. castaneus.*
Nut obovoid, dark-brown; style longer than the nut; stamens 3; margins of glumes hyaline ..... 14. *C. Teneriffæ.*
Nut $\frac{1}{15}$ in. long, obovoid, dark-brown; style shorter than the nut; stamens 1–2; margins of glumes hyaline ..... 15. *C. uncinatus.*
Glumes not mucronate.
Nut white when ripe, $\frac{1}{15}$ in. long, globosely obovoid; stamen 1 (rarely 2); whole plant yellowish ..... 16. *C. flavidus.*
Nut brown.
Nut nearly as long as the obovate-oblong glume; stamen 1 (rarely 2) ..... 17. *C. difformis.*
Nut $\frac{2}{3}$ the length of the glume; glumes with crisped incurved tips; stamens 1–2 ..... 18. *C. pulcherrimus.*
Nut $\frac{1}{3}$ the length of the glume; stamens 2–3; flowering in the first season but often biennial or perennial ..... 19. *C. Haspan.*
Perennials with a woody rootstock; stamens usually 3.
Inflorescence of 1 head (sometimes umbellate in *C. conglomeratus* and *C. Atkinsoni*).
Rhizome very short; rootlets wiry.
Stems slender, close-set, nodose at the base.
Stems closely 1-seriate; spikelets 3–12 in a lax head; stamens 3; glumes $\frac{1}{4}$ in. long ..... 20. *C. niveus.*
Stems cæspitose with 1 dense head; stamen 1; glumes $\frac{1}{12}$ in. long ..... 21. *C. leucocephalus.*
Rhizome creeping; rootlets thick.
Rootlets not woolly.
Stem solitary, distant on a much-divided, elongate, creeping rhizome. 22. *C. arenarius.*
Stems cæspitose, on a short rhizome (inflorescence sometimes umbellate) 23. *C. Atkinsoni.*
Rootlets woolly (inflorescence sometimes umbellate) ..... 24. *C. conglomeratus.*
Spikelets spicately, rarely subracemosely disposed; stamens usually 3.
Rhachilla of spikelets not or scarcely winged.
Annuals with tufted stems.
Stems 4–16 in. long; spikelets $\frac{1}{2}$–$1\frac{1}{4}$ in. long; nut about $\frac{1}{3}$ as long as the glume ..... 25. *C. compressus.*
Stems 3–6 in. long; spikelets $\frac{1}{4}$–$\frac{1}{2}$ in. long; nut less than $\frac{1}{2}$ the length of the glume ... 26. *C. aristatus.*
Stems 14–20 in. long; nut nearly as long as the glume ..... 27. *C. Iria.*
Perennials with woody rhizome and often long stolons.
Spikelets compressed; rootstock with elongate stolons; bracts divaricate ..... 28. *C. procerus.*

Spikelets spicate.
Leaves more than 1 ft. long.
Glumes remote; nut nearly as long as the glume ..... 29. *C. nutans.*
Glumes not remote; nut ½ as long as the glume; bracts never divaricate; no true stolons ..... 30. *C. eleusinoides.*
Leaves not more than 6 in. long ..... 31. *C. malaccensis.*
Rhachilla of spikelets distinctly winged.
Leaves short, rarely ½ as long as the stem.
Glumes approximate; stolons long, stout.
Spikelets pale straw-colored; bracts very short, rarely half as long as the umbel-rays; stem not articulate when dry ... 32. *C. tegetiformis.*
Spikelets rusty-brown; bracts more than half as long as the umbel-rays; stem more or less articulate when dry ..... 33. *C. corymbosus.*
Glumes remote, in fruit scarcely imbricating; stolons 0 ..... 34. *C. tegetum.*
Leaves long, more than half as long as the stem or longer.
Rhizome stoloniferous.
Leaves arising from the stem at some distance above the base and below its middle; stems 4–12 in. long ..... 35. *C. bulbosus.*
Leaves radical.
Stolons 4–8 in. long, bearing hard black fragrant tubers; stems 4–30 in. long ..... 36. *C. rotundus.*
Stolons not or rarely tuberiferous; stems 2–4 ft. long ..... 37. *C. tuberosus.*
Rhizome not stoloniferous.
Spikelets much compressed, ascending; wings persistent ..... 38. *C. exaltatus.*
Spikelets terete, spreading horizontally; wings deciduous ..... 39. *C. digitatus.*
Rhachilla of spikelets disarticulating above the 2 lowest glumes.
Stems less than 1 ft. long; spikelets bearing 1 nut ..... 40. *C. Clarkei.*
Stems much more than 1 ft. long.
Spikelets distant along the rhachis, bearing 1–2 nuts; margins of glumes not hyaline; nut oblong, not curved, ⅛ in. long, pale-brown; style more than ½ as long as the nut; rhizome not stoloniferous ..... 41. *C. konkanensis.*
Spikelets closely packed along the rhachis.
Spikelets bearing 1 nut; margins of glumes hyaline; nut ⅛ in. long, oblong, curved, pale-brown; style not ¼ the length of the nut; rhizome stoloniferous ..... 42. *C. paniceus* var. [*Roxburghiana.*
Spikelets bearing 3–6 nuts; nut $\frac{1}{15}$ in. long, ellipsoid, not curved, black; margins of glumes hyaline; style more than ½ as long as the nut; rhizome stoloniferous ..... 43. *C. pennatus.*
Spikelets bearing 4–14 nuts; margins of glumes not hyaline; rhachilla with oblong persistent wings ..... 44. *C. dilutus.*

1. **Cyperus latespicatus,** *Boeck. in Flora*, v. 42, p. 433 (of no. 28, July 1859, not of no. 27). Usually annual; rhizome not creeping;

stems 4–12 in. high, erect, slender, stiff, obscurely angled, striate. Leaves shorter than the stem, linear, rather rigid, very acute, $\frac{1}{16}$–$\frac{1}{8}$ in. broad. Umbel simple, sometimes reduced to one head; bracts 3, unequal, the longest sometimes reaching 4 in. long, similar to the leaves. Spikelets straw-colored, shaded with chestnut-brown, oblong-lanceolate, compressed, $\frac{3}{8}$–$\frac{5}{8}$ in. long, 20–60-flowered. Glumes $\frac{1}{8}$ in. long, boat-shaped, when opened out broadly ovate, acute, $\frac{1}{10}$ in. broad, leaving a scar on the rhachilla after falling. Nuts obovoid, black, $\frac{1}{20}$ in. long, very shortly apiculate, slightly compressed, microscopically longitudinally striatulate and irregularly subreticulate; style $\frac{1}{30}$–$\frac{1}{20}$ in. long; stigmas 2, filiform, longer than the style. Boeck. in Linnæa, v. 35 (1868) p. 467; Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 40. *Pycreus latespicatus*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 590; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1136.—Flowers: Sept.

KONKAN: *Stocks*!, *Law*! DECCAN: Máwal (Poona districts), *Woodrow*!—DISTRIB. More or less throughout India.

2. **Cyperus malabaricus,** *C. B. Clarke, in Journ. Linn. Soc.* v. 34 (1898) p. 12 (*Pycreus*). Root fibrous; stems cæspitose, slender, 1 ft. high. Leaves about $\frac{2}{3}$ as long as the stem, $\frac{1}{12}$ in. broad, weak. Inflorescence about 1 in. long and broad, composed of 6–12 spikelets arranged upon 2–3 sessile branchlets; involucral bracts 3, similar to the leaves, the longest reaching $3\frac{1}{2}$ in. long. Spikelets 20-flowered, distant, $\frac{1}{4}$–$\frac{5}{8}$ by $\frac{1}{8}$ in., linear-oblong, subacute, the sides exactly parallel. Glumes $\frac{1}{10}$ in. long, boat-shaped, dark brown with narrow white margins, when opened out broadly ovate, acute, and $\frac{1}{16}$ in. wide. Nut globosely ovoid, slightly compressed, very shortly apiculate, brown, microscopically longitudinally striatulate and faintly transversely ribbed; style $\frac{1}{16}$ in. long; stigmas 2, rather shorter than the style, filiform. *Pycreus malabaricus*, C. B. Clarke (*l. c.*), Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.

DECCAN: Lanoli, *Woodrow*!; Khandala, *Cooke*!, *Woodrow*!—DISTRIB. India (W. Peninsula), apparently endemic.

3. **Cyperus sanguinolentus,** *Vahl, Enum.* v. 2 (1806) p. 351. Rhizome creeping, as thick as a crow-quill, 4–10 in. long; stems 4–20 in. long, stout, decumbent at the base, often clothed $\frac{1}{3}$ of their length with leaf-sheaths. Leaves few, many or 0, as long as the stem or shorter, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, acuminate, 1-nerved; midrib often red. Umbel small, simple; bracts 3–5, up to 5 in. long, foliaceous. Spikelets 3–6 (sometimes contracted into a single head), $\frac{1}{4}$–$\frac{3}{8}$ by $\frac{1}{8}$ in., flat, linear or oblong, 6–24-flowered, reddish-brown. Glumes $\frac{1}{10}$ by $\frac{1}{16}$ in., boat-shaped, broadly ovate, obtuse, nearly as broad as long, greenish-yellow and with 3 green nerves at the back, the sides reddish-brown. Anthers linear, muticous. Nuts $\frac{1}{20}$ in. long, suborbicular, laterally compressed, shortly apiculate, biconvex, brown; style $\frac{1}{20}$–$\frac{1}{16}$ in. long; stigmas 2, capillary, about as long as the style. Nees, in Wight, Contrib. (1834) p. 75; Trim. Fl. Ceyl. v. 5, p. 20. *Pycreus sanguinolentus*, Nees, in Linnæa, v. 9 (1835) p. 283; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 590; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1136.

KONKAN: *Law*!; Kalyan, *Woodrow*, 11! DECCAN: Khandala, *Woodrow*. SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, warm parts of the Old World.

4. **Cyperus hyalinus,** *Vahl, Enum.* v. 2 (1806) p. 329. Annual; stems tufted, 2–8 in. long. Leaves as long as the stem or longer, $\frac{1}{6}$ in. broad, narrowly linear, acuminate, flat, flaccid, 1-nerved. Umbels simple, with 3–7 rays reaching 2 in. long or sometimes reduced to clusters of sessile few-flowered spikelets; bracts 3–4, leaf-like, reaching 6 in. long, the largest reaching $\frac{1}{5}$ in. broad. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., yellowish-green, 6–10-flowered, oblong, much compressed; rhachilla stout, winged. Glumes $\frac{1}{6}$ by $\frac{1}{16}$ in., narrowly ovate-oblong, boat-shaped; keel herbaceous, brown, 3-nerved, produced into a long slightly recurved cuspidate point beyond the rounded tip; the sides hyaline, each with 2 strong nerves. Stamens 2–3. Nut $\frac{1}{12}$ by $\frac{1}{20}$ in., somewhat obliquely oblong-obovate, laterally flattened, truncate or slightly retuse at the apex, brown; style $\frac{1}{25}$ in. long; stigmas 2, longer than the style, capillary. Boeck. in Linnæa, v. 35 (1868) p. 482; Trim. Fl. Ceyl. v. 5, p. 19. *Cyperus pumilus,* Nees, in Wight, Contrib. (1834) p. 74 (*not* of Linn.). *Pycreus pumilus,* Nees, in Linnæa, v. 9 (1835) p. 283; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 591.—Flowers: Sept.

Rare. Bombay Presidency without locality, *Dr. Leith,* 25! KONKAN: Sion (Bombay), *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon, Timor.

5. **Cyperus pumilus,** *Linn. Sp. Pl.* ed. 2 (1762) p. 69. Annual; stems tufted, 1–12 in. long, slender. Leaves shorter or longer than the stems, $\frac{1}{20}$–$\frac{1}{8}$ in. broad, linear, 1-nerved, acute. Heads of spikelets $\frac{1}{4}$–$\frac{1}{2}$ in. diam., sometimes broken up into pedunculate spikes or clusters of spikelets, sometimes umbellate, the rays of the umbel 1–6, occasionally though rarely reaching 3 in. long, usually much less; bracts 3–4, leaf-like, up to $4\frac{1}{2}$ in. long. Spikelets $\frac{1}{6}$–$\frac{3}{8}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., 20–50-flowered, much compressed; rhachilla stout, not winged. Glumes $\frac{1}{10}$ in. long by about $\frac{1}{25}$ in. broad in the widest place, ovate, boat-shaped, 2-fid at the tip with a narrow herbaceous keel which is cuspidately produced at the apex, with 3–5 conspicuous brown nerves and with rounded hyaline nerveless sides. Stamen usually 1. Nut ellipsoid-oblong or subobovoid, scarcely $\frac{1}{10}$ in. long, very minutely apiculate, biconvex, laterally compressed, brown; style about equalling the nut, very slender; stigmas 2, capillary, about equalling the style. Trim. Fl. Ceyl. v. 5, p. 19; Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 43. *Cyperus nitens,* Vahl, Enum. v. 2 (1806) p. 331. *Pycreus nitens,* Nees, in Nov. Act. Acad. Cur. v. 19, Suppl. (1843) p. 53; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 591; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1136.—Flowers: Sept.

KONKAN: *Stocks*!, *Law*! DECCAN: Máwal (Poona districts), *Woodrow*; Lanoli, *Woodrow.* KANARA: *Woodrow.* SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, Malaya, China, Tropical Africa, Tropical Australia.

6. **Cyperus globosus,** *All. Auct. Fl. Pedem.* (1789) p. 49. A glabrous very variable annual; root fibrous; stems tufted, 4–25 in. long, very slender, trigonous. Leaves shorter than the heads, very slender, almost filiform. Umbel simple, with 3–5 rays 1–2 in. long, very slender, terminated by solitary or few spikes of 5 or more spreading spikelets, or the spikes capitate; bracts 2–3, leaf-like, the longest sometimes reaching 3 in. long, narrow, almost filiform. Spikelets crowded, $\frac{3}{8}$–$\frac{3}{4}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., linear with parallel sides, much compressed,

20–50-flowered, brown or sometimes almost black; rhachilla stout, tetragonous, not winged, often spotted with red. Glumes $\frac{1}{10}$ by $\frac{1}{25}$ in. long, closely imbricate, ovate-oblong, obtuse; keel greenish-yellow with brownish-red veins; the sides brown with hyaline margins. Stamens 2. Nuts $\frac{1}{30}$ in. long, broadly or narrowly obovoid, rounded and apiculate at the apex, laterally compressed, biconvex, dark chestnut-brown, slightly papillose; style about $\frac{1}{30}$ in. long; stigmas 2, as long as the style, capillary. Trim. Fl. Ceyl. v. 5, p. 21. *Cyperus ater*, Dalz. & Gibs. Bo. Fl. (1861) p. 283 (*not* of Vahl). *C. capillaris*, Kœn. ex Roxb. Fl. Ind. v. 1 (1832) p. 194; Dalz. & Gibs. p. 283. *Pycreus capillaris*, Nees, in Linnæa, v. 9 (1835) p. 283; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 591; Prain, Beng. Pl. p. 1136. *Pycreus capillaris* var. *nilagirica*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 592.

KONKAN: *Stocks*!, *Law*! DECCAN: *Dalzell & Gibson*; Mahableshwar, *Woodrow*; Poona, *Jacquemont*, 409!, *Cooke*!; Soos, 8 miles north-west of Poona, *Bhiva*!; Hura, *Dalzell* ex *C. B. Clarke*.—DISTRIB. Throughout India; Ceylon, temperate and tropical regions of the Old World.

Mr. Clarke describes a variety of this which he has called var. *nilagirica* and founds it on the width of the spikelets, which are, he says, narrower than in the type. I cannot find that the character is at all a reliable one, and I have carefully examined many specimens, both Indian and European. The color of the spikelets in Peninsular specimens is usually darker than that of the Himalayan and European ones, but Mr. Clarke has very distinctly stated in Dyer's 'Flora of Tropical Africa,' v. 8, p. 300, that he has founded the variety not on the color, which he considers accidental, but on the width of the spikelets.

7. **Cyperus albomarginatus,** *Mart. & Schrad. ex Nees, Fl. Bras.* v. 2, part 1 (1842) p. 9. A glabrous annual; stem solitary, erect, 1–3 ft. high, triquetrous above. Leaves shorter than the stem, $\frac{1}{3}$ in. broad. Umbel with 4–12 rays reaching sometimes 7 in. long; secondary umbels with 1–7 rays up to $1\frac{1}{4}$ in. long; bracts large, the longest sometimes reaching 16 by $\frac{1}{4}$–$\frac{1}{3}$ in., linear, acuminate, striate, leaf-like; bracteoles of secondary umbels up to $1\frac{1}{4}$ in. long, very slender, almost filiform. Spikes $1\frac{1}{4}$–$2\frac{1}{2}$ in. long. Spikelets 8–20, distant, spreading, acute, $\frac{1}{2}$–$\frac{3}{4}$ by $\frac{1}{10}$–$\frac{1}{6}$ in., pale brown; rhachilla stout, slightly winged. Glumes $\frac{1}{6}$ by $\frac{1}{16}$ in., elliptic-oblong, rounded and hyaline at the apex, scarcely keeled, compressed, the back 5–7-nerved, the sides yellow or brown with conspicuous white margins chiefly near the apex. Stamens usually 3; anthers linear-oblong. Nut $\frac{1}{10}$ in. long, obovoid, apiculate, rounded at the apex, laterally compressed, granulate, black. *Cyperus Hochstetteri*, Nees ex Krauss, in Flora, v. 28 (1845) p. 755 *in note*; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 69. *Pycreus albomarginatus*, Nees, in Mart. Fl. Bras. v. 2, part 1 (1842) p. 9; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 594; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.

KONKAN: *Stocks*!; N. & S. Konkan, *Law*!; Bombay, ex Herb. Hook. in Herb, Kew. S. M. COUNTRY: Londa, *Woodrow*.—DISTRIB. India (W. Peninsula, Rangoon); Ethiopia, N. Australia.

8. **Cyperus puncticulatus,** *Vahl, Enum.* v. 2 (1806) p. 348. A glabrous annual; stems robust, subsolitary, 1–2 ft. high, erect from a thickened base, trigonous or triquetrous above, the angles smooth. Leaves as long as the stem or shorter, $\frac{1}{6}$–$\frac{1}{2}$ in. broad, rather thick, 1-nerved, pale beneath; margins smooth; sheaths long. Umbel simple or compound, with many slender rays reaching 6 in. or more, terminated

by few or many slender spikes of widely spreading pale or dark brown spikelets; bracts 3–4, the longest sometimes reaching 9 in. or more long and $\frac{1}{8}$–$\frac{1}{6}$ in. broad, leaf-like. Spikelets distant on the slender rhachis, $\frac{1}{4}$–$\frac{3}{4}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., linear or linear-oblong, compressed, soft, 7–30-flowered; rhachilla slender, undulate, slightly winged. Glumes closely imbricate, thin, $\frac{1}{8}$ by $\frac{1}{16}$ in., oblong, obtuse, cymbiform; keel 5-nerved; sides broadly hyaline. Stamens 3. Nut $\frac{1}{16}$ in. long, obovoid, obcordate at the apex, granulate, apiculate, laterally compressed, dark brown; style $\frac{1}{30}$–$\frac{1}{20}$ in. long; stigmas 2, longer than the style, filiform. Dalz. & Gibs. p. 283; Trim. Fl. Ceyl. v. 5, p. 21. *Pycreus Baccha*, Nees, in Linnæa, v. 9 (1835) p. 283; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430. *Pycreus puncticulatus*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 593.

KONKAN: *Dalzell*! S. M. COUNTRY: Londa, *Cooke*!—DISTRIB. India (W. Peninsula); Ceylon, China.

9. **Cyperus odoratus,** *Linn. Sp. Pl.* (1753) p. 46. Perennial; stems tufted, 12–30 in. long, slender, trigonous, thickened at the base, sometimes 0. Leaves shorter than the stem, $\frac{1}{10}$–$\frac{1}{8}$ in. broad; sheath short. Umbel simple, of 2–7 slender rays $\frac{1}{8}$–2 in. long, each terminated by short ternate spikes of 4–8 narrow spikelets; bracts 3–6, spreading, the longest up to 6 in. long or more, leaf-like. Spikelets $\frac{1}{2}$–$\frac{3}{4}$ by $\frac{1}{16}$–$\frac{1}{10}$ in., linear, acuminate, flat, reddish-brown, 20–50-flowered. Glumes $\frac{1}{10}$–$\frac{1}{8}$ by $\frac{1}{30}$ in., closely imbricate, ovate-lanceolate, mucronulate; keel straight, obscurely 3-nerved; the sides yellow streaked with brown with hyaline margins. Stamens usually 2; anthers small, oblong. Nut $\frac{1}{20}$ in. long, oblong-ellipsoid, rounded at the apex, apiculate, laterally compressed, biconvex, faintly granulate, brown; style $\frac{1}{20}$ in. long; stigmas 2, filiform, as long as the style. *Cyperus polystachyos*, Rottb. Descrip. et Icon. (1773) p. 39, t. 11, fig. 1; Grah. Cat. p. 231; Dalz. & Gibs. p. 281; Trim. Fl. Ceyl. v. 5, p. 20. *Pycreus polystachyos*, Beauv. Fl. Ow. v. 2, p. 48, t. 86, fig. 2; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 592; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1136.

The specific name *odoratus*, Linn., has priority over *polystachyos*, Rottb.

KONKAN: Malwán, *Woodrow*. GUJARAT: Surat, *Woodrow*. SIND: *Pinwill*!—DISTRIB. Throughout India near the coast; Ceylon, all warm countries especially near the sea.

10. **Cyperus pygmæus,** *Rottb. Descrip. et Icon.* (1773) p. 20, t. 14, fig. 5. An annual dwarf herb; stems 1–10 in. long, densely tufted. Leaves numerous, as long as or shorter than the stem, $\frac{1}{16}$–$\frac{1}{10}$ in. broad, flaccid, green, acuminate. Spikelets very many (often 100), sessile, densely packed in a terminal head $\frac{1}{4}$–$\frac{2}{3}$ in. in diam., ovate, $\frac{1}{5}$ by $\frac{1}{10}$ in., compressed, 8–20-flowered, green or pale brown; bracts 2–6, dilated at the base, 1–6 in. long, acuminate, leaf-like; rhachilla slender, not winged, often curved or twisted. Glumes closely imbricate, $\frac{1}{10}$–$\frac{1}{8}$ by $\frac{1}{30}$ in., oblong-lanceolate cuspidate, the back streaked with brown, the sides with broadly hyaline margins. Stamen 1 (rarely 2); anthers linear-oblong, muticous. Nut $\frac{1}{25}$ in. long, ellipsoid, plano-convex or trigonous, orange-brown; style $\frac{1}{30}$ in. long; stigmas 2, capillary, about as long as the style. Boeck. in Linnæa, y. 35 (1868) p. 493; C. B.

Clarke, in Journ. Linn. Soc. v. 21, p. 81; Trim. Fl. Ceyl. v. 5, p. 18. *Cyperus squarrosus*, Roxb. Hort. Beng. (1814) p. 81 (*not* of Linn.); Grah. Cat. p. 231. *Juncellus pygmæus*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 596; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1138.—Flowers: Oct.

KONKAN: *Law*! DECCAN: Poona, *Woodrow*. GUJARAT: Surat, *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, Malaya, N. Trop. Africa, China, Japan, Australia, Europe (Mediterranean regions).

11. **Cyperus lævigatus,** *Linn. Mantiss.* (1771) p. 179. Glabrous; rhizome creeping horizontally, $\frac{1}{6}$ in. in diam., long and with solitary distant stems, or short and with crowded stems, their bases enclosed by imbricate shining chestnut-red scales; stems 4–24 in. long, round, somewhat fleshy. Leaves usually short or scarcely any, sometimes as long as the stem, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, the upper part often terete. Spikelets 1–30 in one apparently lateral head, solitary or clustered, straw-colored; bracts 2, the lower as though a continuation of the stem 1–3 in. long, the other much shorter or wanting. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ by $\frac{1}{8}$ in., ovate, subacute, compressed but thick, straw-colored dotted with brown spots, 12–30-flowered; rhachilla stout, quadrangular, dotted with brown spots. Glumes $\frac{1}{10}$–$\frac{1}{8}$ by $\frac{1}{20}$–$\frac{1}{16}$ in., ovate or oblong, acute, mucronulate, closely imbricate, dotted with brown spots, the sides with hyaline margins. Stamens 3; filaments ligulate, membranous; anthers linear, $\frac{1}{16}$ in. long, yellow with a reddish-brown acute tip. Nut $\frac{1}{20}$ in. long, obovoid, plano-convex; style about as long as the nut; stigmas 2, short. Boeck. in Linnæa, v. 35 (1868) p. 486; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 77. *Juncellus lævigatus*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 596; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.

Dalzell without locality in Herb. Kew.! KONKAN: Salt-marshes near Bombay, *Woodrow*. GUJARAT: Kathiawar, *Woodrow*. SIND: *Pinwill*.—DISTRIB. India (Kashmir, Panjáb, W. Peninsula); Europe (Mediterranean region), Africa, W. Asia, Australia, S. America.

VAR. *junciformis*, C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 79. Rigid; spikelets 1–6, rigid, shining, chestnut or black. *Juncellus lævigatus* var. *junciformis*, C. B. Clarke, in Fl. B. I. v. 6, p. 597. *Cyperus junciformis* (sp.), Desfont. Fl. Atlant. v. 1 (1798) p. 42, t. 7, fig. 1.

SIND: *Stocks*, 751!

12. **Cyperus alopecuroides,** *Rottb. Descrip. et Icon.* (1773) p. 38, t. 8, fig. 2. A large glabrous perennial herb; root fibrous; stems 2–3 ft. high, stout, often 1 in. or more in diam. at the base, trigonous above, the angles smooth. Leaves many, as long as the stem or shorter, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, coriaceous, acute. Umbel large, compound, with 4–6 primary rays up to 4 in. long, slender; secondary rays up to 1 in. long bearing clusters of oblong, sessile and pedunculate spikes $\frac{2}{3}$–$1\frac{1}{4}$ by $\frac{1}{3}$–$\frac{1}{2}$ in., densely covered with small spikelets; rhachis of spike stout; bracts reaching 18 in. long by $\frac{1}{2}$ in. broad at the base, leaf-like; bracteoles 3–4, linear, acute, slender, sometimes wanting. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ by $\frac{1}{10}$ in., elliptic-lanceolate or ovate-oblong, subacute, compressed, straw-colored; rhachilla stout, subtetragonous, not winged. Stamens 3;

anthers long, linear, muticous. Glumes $\frac{1}{10}$ by $\frac{1}{30}$ in., not keeled, obscurely nerved, ovate-oblong, mucronulate, with broad hyaline margins, the sides and back streaked with brown. Nut $\frac{1}{20}$ in. long, ellipsoid, plano-convex or biconvex, sometimes subtrigonous, pale yellow when young, ashy-brown in age. Grah. Cat. p. 232; Dalz. & Gibs. p. 282; Trim. Fl. Ceyl. v. 5, p. 38; Boeck. in Linnæa, v. 36 (1870) p. 321; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 74. *Juncellus alopecuroides*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 595; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.

Dalzell without locality in Herb. Kew.! KONKAN: Bombay, *Jacquemont*, 438! DECCAN: *Woodrow*; between Ellora and Poona, *Jacquemont*, 279! GUJARAT: Panch Mahâls, *Woodrow*. SIND: *Stocks*!—DISTRIB. Throughout India; Ceylon, Africa, Tropical Australia.

13. **Cyperus castaneus,** *Willd. Sp. Pl.* v. 1 (1797) p. 278. A low herb 1–7 in. high; stems few or many, tufted, slender. Leaves as long as or shorter than the stem, $\frac{1}{16}$–$\frac{1}{12}$ in. broad; sheaths often purple. Umbel usually simple, consisting of a central sessile head and few or many unequal spreading rays $\frac{1}{4}$–$1\frac{1}{2}$ in. long (rarely again divided, sometimes reduced to a terminal head); rays terminated by heads of 3–20 stellately spreading spikelets; bracts 3–5, the longest sometimes reaching 6 in. long, narrowly linear, leaf-like, dilated at the base, cuspidate at the apex, spreading. Spikelets $\frac{1}{6}$–$\frac{3}{4}$ by $\frac{1}{20}$–$\frac{1}{10}$ in. long, oblong or linear, compressed, usually dark chestnut-brown, many-flowered. Glumes $\frac{1}{16}$–$\frac{1}{12}$ in. long (excluding the mucro) by $\frac{1}{30}$ in. broad; keel greenish-yellow, produced beyond the rounded tip into a long recurved mucro; sides usually chestnut-brown, the margins not hyaline; rhachilla rather stout, scarcely winged. Stamens 1–2; anthers small. Nut $\frac{1}{20}$ in. long, oblong, trigonous, shortly apiculate, narrowed at the base, pale brown or yellow, granulate; style shorter than the nut; stigmas 3, filiform. Fl. B. I. v. 6, p. 598; Boeck. in Linnæa, v. 35 (1868) p. 496; Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 87; Trim. Fl. Ceyl. v. 5, p. 25; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.—Flowers: Oct.–Dec.

Rare. KONKAN: *Cooke*!; Bombay, *Woodrow*; Laddapur, *Bhiva*!—DISTRIB. India (Nepal, Sikkim, Pegu, W. Peninsula); Ceylon, Tonkin, Central Australia.

14. **Cyperus Teneriffæ,** *Poir. Encyc. Méthod.* v. 7 (1806) p. 245. A low glabrous annual of a reddish-brown color; root fibrous; stems 2–8 in. long, tufted. Leaves usually shorter than the stem, $\frac{1}{8}$ in. broad, linear, acute; sheaths reddish, inflated. Head solitary, of 3–20 sessile spikelets; bracts 2, the longest $\frac{3}{4}$–$1\frac{1}{2}$ in. long, narrowly linear, acute, leaf-like. Spikelets $\frac{1}{3}$–$\frac{5}{8}$ by $\frac{1}{5}$–$\frac{1}{4}$ in., much compressed, reddish-brown. Glumes $\frac{1}{8}$ in. long (including the mucro) by $\frac{1}{16}$ in. broad, boat-shaped, keeled; keel produced into a conspicuous recurved mucro; sides with 4–5 conspicuous ribs on each, the margins hyaline. Stamens 3; anthers oblong, muticous. Nut $\frac{1}{20}$ in. long, obovoid, obtuse, shortly apiculate, triquetrous, dark brown; style longer than the nut; stigmas 3, shorter than the style. I have not found any of the nuts reticulate black and white as stated in the 'Flora of British India.' Fl. B. I. v. 6, p. 601; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430. *Cyperus Wightii*, Nees, in Wight, Contrib. (1834) p. 78; Boeck. in Linnæa, v. 35

(1868) p. 507. *C. rubicundus*, Kunth, Enum. v. 2 (1837) p. 49 (*not* of Vahl); Boeck. in Linnæa, v. 35 (1868) p. 507; C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 104.—Flowers: Sept.

Rare. DECCAN: Poona, *Woodrow*, 143!—DISTRIB. India (W. Peninsula); Teneriffe, Africa.

15. **Cyperus uncinatus,** *Poir. Encyc. Méthod.* v. 7 (1806) p. 247. A glabrous annual; stems 3–6 in. long, tufted, slender. Leaves as long as or shorter than the stem, filiform, flexuous. Umbel simple, consisting of a central sessile head and few or many filiform spreading unequal rays $\frac{1}{4}$–1 in. long, each terminated by a head of stellately spreading spikelets; bracts 3–5, filiform, much longer than the rays, the longest sometimes reaching 3 in. long. Spikelets $\frac{1}{5}$–$\frac{1}{2}$ by $\frac{1}{8}$ in., 5–12 in a cluster, compressed, 12–24-flowered, reddish-brown; rhachilla scarcely winged, slender. Glumes $\frac{1}{16}$ in. long (not including the mucro, which is nearly as long as the limb), oblong, obtuse, about $\frac{1}{50}$ in. broad; keel 3-nerved, produced into a long recurved mucro; sides usually brown, hyaline. Stamens 1–2; anthers short, oblong. Nut about $\frac{1}{30}$ in. long, obovoid, trigonous, shortly apiculate, dark brown, faintly granulate; style shorter than the nut, very slender; stigmas 3, capillary, about equalling the style. Distinguished from *C. castaneus*, which it much resembles, by the nuts which are obovoid, those of *C. castaneus* being oblong and longer. C. B. Clarke, in Dyer's Fl. Trop. Africa, v. 8 (1902) p. 328. *Cyperus cuspidatus*, H. B. & K. Nov. Gen. & Sp. v. 1 (1815) p. 204; Boeck. in Linnæa, v. 35 (1868) p. 496; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 88 & in Hook. f. Fl. B. I. v. 6, p. 598; Trim. Fl. Ceyl. v. 5, p. 26; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1139.

DECCAN: Lanoli, *Woodrow*. SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, Tropical Africa, Java, China, Australia, America.

16. **Cyperus flavidus,** *Retz. Obs.* fasc. 5 (1789) p. 13. Annual; root fibrous, dark purple (*Dalz. & Gibs.*); stems tufted, 6–8 in. high, weak, obtusely trigonous. Leaves shorter or longer than the stem, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, linear, acute. Umbel compound or decompound, when mature yellow or finally blackening; rays many, the primary 1–2 in. long, the secondary $\frac{1}{2}$–1 in. long, bearing heads of stellately spreading minute spikelets; bracts 2–3, the longest reaching 6 in. long; bracteoles 0. Spikelets $\frac{1}{8}$–$\frac{1}{4}$ by $\frac{1}{16}$ in., linear-lanceolate. Glumes $\frac{1}{25}$ in. long, oblong, rounded (not mucronate) at the tip, with a green obscurely 3-nerved back, the sides with hyaline margins. Stamen 1 (rarely 2); anthers linear, muticous. Nut $\frac{1}{50}$ in. long, globosely obovoid, trigonous, rounded, shortly and stoutly stipitate, at first pale-yellow, becoming white when quite ripe. Dalzell & Gibson (Bo. Fl. p. 285) say that the plant is easily recognized by its yellow hue. Fl. B. I. v. 6, p. 600; Dalz. & Gibs. p. 284; C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 122; Trim. Fl. Ceyl. v. 5, p. 27; Prain, Beng. Pl. p. 1139. *Cyperus Haspan* var. *α indicus*, Boeck. in Linnæa, v. 35 (1868) p. 574.

DECCAN: *Dalzell & Gibson*.—DISTRIB. More or less throughout India in rice-fields; Ceylon, warm regions of the Old World.

17. **Cyperus difformis,** *Linn. Cent. Pl. part* 2 (1755), *in Amœn. Acad.* v. 4 (1788) p. 302. A glabrous annual; root fibrous; stems 4–

20 in. long, tufted, weak, triquetrous towards the top. Leaves few, usually shorter than the stem, $\frac{1}{8}$–$\frac{1}{6}$ in. broad, linear, acuminate, obscurely nerved, flaccid. Spikes in a simple or compound umbel or contracted into a head; rays of the umbel 3–6, slender, up to $1\frac{1}{2}$ in. long; bracts 2–4, the lowest 2–10 in. long, leaf-like. Spikelets many, in dense heads, dusky or brown, $\frac{1}{8}$–$\frac{1}{5}$ by $\frac{1}{25}$ in., oblong, obtuse, 10–30-flowered; rhachilla slender, not winged. Glumes $\frac{1}{30}$–$\frac{1}{25}$ in. long, closely imbricate, obovate-oblong, obtuse, concave, 3-nerved and rounded on the back; sides broadly hyaline. Stamen 1 (less commonly 2); anthers small, oblong, muticous, yellow. Nut $\frac{1}{30}$ in. long, ellipsoid, obtusely trigonous, rounded and apiculate at the apex, smooth, yellow or brown; style much shorter than the nut; stigmas 3, linear, short. Fl. B. I. v. 6, p. 598; Grah. Cat. p. 232; Dalz. & Gibs. p. 282; Boeck. in Linnæa, v. 35 (1868) p. 586; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 133; Trim. Fl. Ceyl. v. 5, p. 25; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1139.—Flowers: Oct.–Jan.

KONKAN: Matheran, *Woodrow*. DECCAN: Chinchwad, near Poona, *Woodrow*; Khandala, *Woodrow*; between Ellora and Poona, *Jacquemont*, 275!—DISTRIB. More or less throughout India; Ceylon, the Old World generally in warm regions.

18. **Cyperus pulcherrimus,** *Willd. in Kunth, Enum.* v. 2 (1837) p. 35. Rhizome short, creeping; root-fibres slender; stems 12–18 in. long, slender, trigonous. Leaves as long as the stem or longer, narrowly linear, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, weak, 1-nerved. Umbel compound, contracted; rays very many, reaching $1\frac{1}{2}$ in. long, bearing crowded umbellules whose subglobose heads of innumerable spikelets conceal the secondary rays which are $\frac{1}{4}$–$\frac{3}{8}$ in. long; bracts 3–6, leaf-like, the longest reaching 6 in. long. Spikelets 8–12, small, not reaching $\frac{1}{4}$ in. long, about $\frac{1}{25}$ in. broad, densely crowded, oblong-lanceolate, 12–30-flowered; rhachilla not winged, slender. Glumes ovate-oblong, obtuse, with crisped incurved tips, the sides hyaline with 2 broad reddish-brown bands. Stamens 1–2; anthers linear. Nut minute, half as long as the glume, shortly and stoutly stipitate, globosely trigonous, acute at both ends, granulate; style nearly as long as the nut; stigmas 3, capillary. Fl. B. I. v. 6, p. 600; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 132; Boeck. in Linnæa, v. 35 (1868) p. 573; Trim. Fl. Ceyl. v. 5, p. 27.

SIND: *Pinwill*!—DISTRIB. India (Assam); Ceylon, Penang, Java, Borneo.

19. **Cyperus Haspan,** *Linn. Sp. Pl.* (1753) p. 45. Perennial, glabrous; rhizome creeping, clothed with ovate triangular scales, giving off solitary or tufted stout or slender trigonous or triquetrous often compressed stems 4–24 in. long. Leaves usually shorter (sometimes longer) than the stem, $\frac{1}{8}$–$\frac{1}{6}$ in. broad, acute, erect (occasionally very short and subulate); sheaths inflated. Umbel simple or compound, of 4–12 very unequal rays up to 3 in. long; secondary rays bearing 3–8 slender stellately spreading spikelets; bracts 2–3, variable, narrow and shorter than the rays, or broader than the leaves and 3 in. long. Spikelets $\frac{1}{6}$–$\frac{1}{3}$ by $\frac{1}{16}$–$\frac{1}{12}$ in., linear, acute, flat, 10–40-flowered, pale or chestnut-brown; rhachilla narrow, scarcely winged. Glumes $\frac{1}{18}$ by $\frac{1}{50}$ in., ovate-oblong, rounded on the back, not or obscurely mucronate by the excurrent midrib; sides hyaline, usually brown. Stamens 2 or 3;

anthers linear-oblong. Nuts $\frac{1}{50}$ in. long, globosely obovoid, rounded and shortly apiculate at the apex, trigonous, on a short thick stipes, yellow or pale-brown; style longer than the nut; stigmas 3, capillary. Fl. B. I. v. 6, p. 600; Grah. Cat. p. 231; Dalz. & Gibs. p. 282; Boeck. in Linnæa, v. 35 (1868) p. 574; Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 119; Trim. Fl. Ceyl. v. 5, p. 26; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1139; Watt, Dict. Econ. Prod. v. 2, p. 684.—Flowers: Oct.–Dec.

KONKAN: Ratnagiri, *Woodrow*. DECCAN: Lanoli, *Woodrow*.—DISTRIB. Throughout India, common in rice-fields; Ceylon, Malaya, Indo-China, Tropical Africa and Australia.

20. **Cyperus niveus,** *Retz. Obs.* fasc. 5 (1789) p. 12. Glabrous, glaucescent; rhizome woody, short, the rootlets wiry; stems 8–16 in. long, nodose at the base, closely 1-seriate. Leaves much shorter than the stem, narrowly linear, setaceo-acuminate, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, weak. Spikelets 3–12 in one head, reaching $\frac{3}{4}$ by $\frac{1}{4}$ in., oblong-elliptic, compressed, pale, sometimes almost white, 20–40-flowered; rhachilla not winged; bracts usually 2, the longest reaching $2\frac{1}{2}$ in. long, finely acuminate, not dilated at the base, leaf-like. Glumes $\frac{1}{5}$ by $\frac{1}{16}$ in., ovate-lanceolate, compressed; keel produced into a very short mucro; sides whitish or whitish-brown, multistriate, with narrow hyaline margins. Stamens 3; filaments long, persistent; anthers linear, muticous, exserted from the glume. Nut $\frac{1}{12}$ in. long, obovoid, triquetrous, dark brown; style $\frac{1}{16}$ in. long; stigmas 3, rather shorter than the style. Fl. B. I. v. 6, p. 601; Boeck. in Linnæa, v. 35 (1868) p. 530; C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 108; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1139; Watt, Dict. Econ. Prod. v. 2, p. 686.—Flowers: Nov.

SIND: *Pinwill*; Hyderabad, *Woodrow*.—DISTRIB. More or less throughout India; Afghanistan, China.

21. **Cyperus leucocephalus,** *Retz. Obs.* fasc. 5 (1789) p. 11. A glabrous herb; rhizome very short, woody, with long fibrous rootlets; stems cæspitose, very slender, nodose at the base, each carrying one head. Leaves shorter than the stem, narrow, $\frac{1}{20}$–$\frac{1}{16}$ in. broad, many-nerved. Heads dense, globose, white, $\frac{1}{4}$–$\frac{3}{8}$ in. in diam., containing 8–50 spikelets; bracts 3 (rarely 4), the longest reaching $2\frac{1}{2}$ in. long, narrowly linear, long-acuminate, many-nerved. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., compressed, elliptic, 10–18-flowered. Glumes $\frac{1}{12}$ by $\frac{1}{40}$ in., oblong-lanceolate, subobtuse, whitish or pale-brown, with hyaline margins. Stamen 1; anthers oblong, muticous. Nut $\frac{1}{30}$ in. long, oblong-ellipsoid, trigonous, shortly apiculate, granulate, black; style $\frac{1}{16}$ in. long; stigmas 3, as long as the style. Fl. B. I. v. 6, p. 602; Boeck. in Linnæa, v. 35 (1868) p. 590; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 107; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.

KONKAN: N. & S. Konkan, *Law*!—DISTRIB. Tropics generally.

22. **Cyperus arenarius,** *Retz. Obs.* fasc. 4 (1786) p. 9. Whole plant pale or glaucous-green; rhizome elongate, creeping, striate, rigid, dichotomously branched, clothed with lanceolate chestnut-brown sheaths; rootlets thick, glabrous; stems solitary, 4–12 in. long, distant, stout, rigid, terete, attenuated at the base into the rhizome, clothed below

with long withered sheaths. Leaves longer or shorter than the stem, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, linear, spreading and recurved, rigidly coriaceous, terete and grooved above, or broader with complicate sides, not keeled, almost nerveless. Heads solitary on the summit of the stems, globose, $\frac{1}{2}$–$1\frac{1}{2}$ in. in diam., of many sessile radiating spikelets; bracts 2–3, leaf-like, rigid, the lowest 2–4 in. long, erect, simulating a continuation of the stem, the others much shorter. Spikelets $\frac{3}{8}$–$\frac{1}{2}$ by $\frac{1}{6}$–$\frac{1}{4}$ in., elliptic-lanceolate, straw-colored, becoming ultimately brown, 8–16-flowered; rhachilla stout, not winged. Glumes $\frac{1}{3}$–$\frac{1}{2}$ by $\frac{1}{10}$ in., ovate-oblong, boat-shaped, obtuse, minutely mucronate, dorsally rounded, streaked with brown, the sides with many strong nerves and hyaline margins. Stamens 3; filaments elongate, ligulate, persistent; anthers narrowly linear, muticous, exserted from the glume. Nut $\frac{1}{16}$ in. long, obovoid, rounded at the apex, trigonous, black; style $\frac{1}{16}$–$\frac{1}{10}$ in. long; stigmas 3, capillary, exserted from the glume. Fl. B. I. v. 6, p. 602; Dalz. & Gibs. p. 284; Boeck. in Linnæa, v. 35 (1868) p. 536; C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 106; Trim. Fl. Ceyl. v. 5, p. 23; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.—Flowers: Oct.–Nov.

KANARA: Karwar, *Talbot*, 553! GUJARAT: Domas near Surat on the sea-coast, *Dalzell*!; Ahmedabad, *Woodrow*, 21! SIND: *Pinwill*!, *Stocks*!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (sea-coast from Sind to Ceylon and Orissa, Panjáb); Ceylon, Persia, Arabia.

23. **Cyperus Atkinsoni,** *C. B. Clarke, in Journ. Linn. Soc.* v. 21 (1884) p. 109. Rhizome short, woody; roots not woolly; stems cæspitose, 2–7 in. long, trigonous below, terete above, thickened at the base. Leaves as long as or shorter than the stem, rigid, $\frac{1}{10}$–$\frac{1}{8}$ in. broad at the base, tapering towards the finely cuspidate apex. Umbel simple, often contracted into a head; rays 3–4, reaching $\frac{3}{8}$–$1\frac{1}{8}$ in. long; bracts *2–3, the longest 2–3 in. long.* Spikelets $\frac{3}{8}$–$\frac{7}{8}$ by $\frac{1}{8}$–$\frac{1}{6}$ in., *20–30-flowered, narrowly linear, subacute; rhachilla not winged.* Glumes oblong-lanceolate, cymbiform, $\frac{1}{3}$–$\frac{1}{6}$ by $\frac{1}{20}$ in., with a strong sharp slightly recurved mucro $\frac{1}{30}$ in. long beyond the subacute tip; the back pale, the sides pale or cinnamon-colored, multistriate, the margins hyaline. Stamens 3; filaments $\frac{1}{3}$ in. long, ligulate, persistent; anthers $\frac{1}{16}$ in. long, linear, yellow. Nut $\frac{1}{16}$ in. long, obovate, trigonous, yellow; style $\frac{1}{20}$–$\frac{1}{16}$ in. long; stigmas 3, much longer than the style, capillary. Fl. B. I. v. 6, p. 603; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.

Dalzell without locality in Herb. Kew.! SIND: *Stocks*!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (Kashmir, N.W. Himalaya, W. Peninsula).

24. **Cyperus conglomeratus,** *Rottb. Descrip. et Icon.* (1773) p. 21, t. 15, fig. 7. Glabrous, glaucous-green; rhizome short or long, woody, creeping, $\frac{1}{3}$–$\frac{1}{6}$ in. in diam.; roots of stout woolly fibres; stems stout, 6–20 in. long, terete below, trigonous above, thickened at the base, clothed with brown ovate acuminate scales. Leaves as long as the stem or shorter, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, coriaceous, dorsally rounded (not keeled), shortly cuspidate at the tip, the margins involute when dry; nerves obscure. Umbel simple, often contracted into one head 1–$1\frac{1}{2}$ in. diam. of densely crowded spreading spikelets; bracts 3–4, elongate, narrower than the leaves, shortly cuspidate. Spikelets $\frac{1}{2}$–1 by $\frac{1}{3}$–$\frac{1}{6}$ in., oblong-lanceolate, compressed, 10–24-flowered; rhachilla stout, scarred, not winged. Glumes reaching $\frac{1}{3}$ by $\frac{1}{16}$ in., oblong-lanceolate, cymbiform,

with a short stout mucro extending beyond the rounded tip, with many reddish-brown nerves and hyaline margins. Stamens 3; filaments $\frac{1}{10}$ in. long, ligulate; anthers yellow, $\frac{1}{8}$ in. long, narrowly linear, muticous. Nut (immature) $\frac{1}{10}$ in. long, obovoid, compressed, trigonous, yellow; style reaching $\frac{1}{8}$ in. long, flattened; stigmas 3, capillary, much longer than the style. Fl. B. I. v. 6, p. 602; Trim. Fl. Ceyl. v. 5, p. 23; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430. *Cyperus pungens*, Boeck. in Linnæa, v. 35 (1868) p. 537; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 113.—Flowers: Nov.-Feb.

GUJARAT: Ahmedabad, *Woodrow*. SIND: *Pinwill*!; Sibi, *Lace*, 3462!—DISTRIB. India (W. Peninsula); Ceylon, Trop. Africa, Mediterranean region.

VAR. *pachyrhizus*, Trimen MSS. ex Hook. f. in Trim. Fl. Ceyl. v. 5 (1900) p. 23. More slender; leaves narrower; heads 2 in. in diam.; spikelets smaller and narrower; glumes muticous. *C. pachyrhizus* (sp.), Nees ex Boeck. in Linnæa, v. 35 (1868) p. 545; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 111 & in Hook. f. Fl. B. I. v. 6, p. 603; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.—Flowers: Nov.-Dec.

KONKAN: *Law*! GUJARAT: (Kathiawar) Verawal, *Woodrow*!; Porbander, *Woodrow*. —DISTRIB. India (W. Peninsula); Ceylon, Laccadive Isles.

25. **Cyperus compressus,** *Linn. Sp. Pl.* (1753) p. 46. A glabrous annual; root fibrous; stems tufted, 4–16 in. long, erect, slender, trigonous, with rounded smooth angles. Leaves shorter or longer than the stem, $\frac{1}{16}$–$\frac{1}{6}$ in. broad, finely acuminate, 1-nerved. Umbel simple, often with a sessile head at the fork or occasionally altogether reduced to a sessile head; rays 3–6, reaching 3 in. long, bearing 4–8 terminal spikelets; bracts 3–5, finely acuminate, leaf-like, the longest reaching $4\frac{1}{2}$ in. long. Spikelets $\frac{1}{2}$–$1\frac{1}{4}$ by $\frac{1}{6}$–$\frac{1}{5}$ in., much compressed, yellow when ripe, linear-oblong, 20–40-flowered; rhachilla stout, angular, closely scarred, scarcely winged. Glumes $\frac{1}{5}$ in. long (including the mucro), oblong-lanceolate, closely imbricate; keel produced into a slightly recurved, laterally compressed mucro $\frac{1}{20}$–$\frac{1}{16}$ in. long, beyond the obtuse tip; sides membranous, green or yellow, striate, with short hyaline margins. Stamens 3; filaments nearly $\frac{1}{4}$ in. long, ligulate; anthers $\frac{1}{12}$ in. long, yellow, linear, muticous. Nut $\frac{1}{10}$ in. long, broadly obovoid, triquetrous, black; style $\frac{1}{16}$ in. long; stigmas 3, as long as the style. Fl. B. I. v. 6, p. 605; Grah. Cat. p. 231; Dalz. & Gibs. p. 282; Boeck. in Linnæa, v. 35 (1868) p. 517; C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 97; Trim. Fl. Ceyl. v. 5, p. 33; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1140; Watt, Dict. Econ. Prod. v. 2, p. 683.

DECCAN: *Dalzell & Gibson*; Poona, *Woodrow*. SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, Tropical Africa, Asia, and America.

26. **Cyperus aristatus,** *Rottb. Descrip. et Icon.* (1773) p. 23, t. 6, fig. 1. A small glabrous annual 3–6 in. high; roots fibrous; stems tufted, stout or slender, trigonous. Leaves usually shorter than the stem, erect, $\frac{1}{20}$–$\frac{1}{10}$ in. broad, acuminate, flat, 1-nerved, flaccid. Umbel with 2–5 rays, or capitate with numerous spikelets crowded into a globose or oblong head $\frac{1}{4}$–$\frac{1}{2}$ in. long; bracts 2–5, the longest reaching in well-developed specimens $3\frac{1}{2}$ in. long, broader than the leaves at the

base, gradually tapering to a fine point. Spikelets $\frac{1}{5}$–$\frac{1}{3}$ by $\frac{1}{8}$–$\frac{1}{6}$ in., oblong, flat, 6–20-flowered, usually brownish; rhachilla not winged. Glumes $\frac{1}{8}$ in. long (including the mucro) by $\frac{1}{30}$ in. broad, oblong; keel strong, produced into a recurved beak as long as the limb; sides many-nerved up to near the margin, pale or brown. Stamen 1; filaments $\frac{1}{12}$ in. long; anthers small, oblong. Nut $\frac{1}{20}$ in. long, narrowly obovoid, rounded and apiculate at the apex, tapering towards the base, trigonous, reddish-brown; style $\frac{1}{30}$ in. long; stigmas 3, about as long as the style, capillary. Fl. B. I. v. 6, p. 606; Boeck. in Linnæa, v. 35 (1868) p. 500; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 91; Trim. Fl. Ceyl. v. 5, p. 24; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1140.—Flowers: Sept.

Deccan: Poona, *Jacquemont*, 315!, *Woodrow*.—Distrib. More or less throughout India, Ceylon, Trop. Africa, Australia, America.

27. **Cyperus Iria,** *Linn. Sp. Pl.* (1753) p. 45. A glabrous annual; root fibrous; stems tufted, 14–20 in. long, triquetrous, striate. Leaves as long as the stem or shorter, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, multistriate, finely acuminate, flaccid. Umbel decompound, of many primary rays 1–5 in. long, bearing irregularly fascicled umbellules formed of narrow interrupted spikes of 5–20 small few-flowered spikelets; bracts 3–5, the longest sometimes reaching 8 in. long. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., linear-oblong, obtuse, compressed, 6–20-flowered, yellow or pale brown; rhachilla not winged. Glumes $\frac{1}{10}$ by $\frac{1}{16}$ in., elliptic-obovate, obtuse, muticous or very minutely apiculate, loosely or scarcely imbricate, 3–5-nerved, with broad hyaline margins. Stamens 2 or 3; anthers small, oblong, muticous, yellow. Nut $\frac{1}{12}$ in. long, obovoid, triquetrous, brown or black; style very short, scarcely $\frac{1}{50}$ in. long; stigmas 3, very short, slightly exserted from the glume. Fl. B. I. v. 6, p. 606; Grah. Cat. p. 232; Dalz. & Gibs. p. 282; Boeck. in Linnæa, v. 35 (1868) p. 595; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 137; Trim. Fl. Ceyl. v. 5, p. 18; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1140; Watt, Dict. Econ. Prod. v. 2, p. 685.—Flowers: Dec.

Konkan: Neral (below Matheran), *Bhiva*! Deccan: *Dalzell & Gibson*; Poona, *Jacquemont*, 344!; Matheran, *Woodrow*; Khandala, *Woodrow*.—Distrib. Throughout India in rice-fields; Ceylon, Indo-China, Australia, Mediterranean region.

Var. *paniciformis*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 607. Spikelets bearing 2–4 nuts; spikes often drawn out into nearly linear racemes. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430. *Cyperus paniciformis* (sp.), Franck. & Savat. Pl. Japon. v. 2 (1879) p. 103 and p. 537. *C. parviflorus*, Nees, in Wight, Contrib. (1834) p. 87 (exclud. all syn.).—Flowers: Sept.

Konkan: Neral (below Matheran), *Cooke*!, *Bhiva*! Deccan: Khandala, *Woodrow*.—Distrib. India (Kashmir, W. Peninsula, Andamans); China, Japan, Malaya, Polynesia.

28. **Cyperus procerus,** *Rottb. Descrip. et Icon.* (1773) p. 29, t. 5, fig. 3. Perennial; rootstock short, stout, stoloniferous, the stolons elongate, clothed with long acuminate scales, bulbilliferous; stems 2–3 ft. long, acutely triquetrous. Leaves very long, often exceeding the stems, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, acuminate, thickly coriaceous or spongy; sheaths broad,

compressed, membranous. Umbel compound; primary rays 3–7, stout, 1–4 in. long; secondary rays bearing loosely corymbose spikes of 5–10 spreading compressed spikelets; rhachis of spikes rather stout, angular, glabrous; bracts 2–5, the longest reaching sometimes 15 in. long, divaricate, leaf-like. Spikelets remote, ½–1 by ⅙ in., linear-oblong, 10–50-flowered, straw-colored or red; rhachilla scarcely winged or winged here and there, tetragonous. Glumes ⅓–⅙ in. long, rather loosely imbricate, cinnamon-red or straw-colored, boat-shaped; back with 5 or more nerves; sides and tip with hyaline margins. Stamens 3; anthers $\frac{1}{10}$ in. long, oblong, muticous, yellow. Nut $\frac{1}{16}$ in. long, broadly obovoid, trigonous, apiculate, tapering towards the base, yellow; style $\frac{1}{20}$ in. long; stigmas 3, longer than the style, capillary. Fl. B. I. v. 6, p. 610; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 152; Trim. Fl. Ceyl. v. 5, p. 34; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1140. *Cyperus Heynei*, Boeck. in Linnæa, v. 35 (1868) p. 600.

Rare. KONKAN: Goa, *Woodrow*.—DISTRIB. More or less throughout India, chiefly near the sea; Ceylon, Tonkin, Java.

29. **Cyperus nutans,** *Vahl, Enum.* v. 2 (1806) p. 363. A tall perennial; rhizome tuberous, thicker than the thumb in old plants, creeping; root-fibres matted; stems 2–3½ ft. long, stout, trigonous, with smooth angles. Leaves as long as the stem, linear, ¼–½ in. broad, coriaceous in old plants, multistriate. Umbel very large, decompound; primary rays reaching 10 in. long, slender, trigonous, bearing numerous bracteate umbellules with secondary rays 1–2 in. long, each secondary ray terminated by many unequal simple or paniculate lax spikes 1–1½ in. long, forming tassel-like clusters; rhachis slender; bracts 4–8, the longest up to 12 by ½ in. Spikelets erect, ¼–⅓ by $\frac{1}{10}$ in., 6–10-flowered, pale reddish-brown; rhachilla slender, scarcely winged, with long internodes between the glumes about ⅓ the length of the glume. Glumes $\frac{1}{12}$ by $\frac{1}{30}$ in., oblong, distant, erect, obtuse, shortly apiculate, rounded on the back, obscurely nerved, with narrow hyaline margins. Stamens 3; anthers linear-oblong. Nut $\frac{1}{16}$ in long, narrowly obovoid or oblong, tapering towards the base, triquetrous, apiculate, yellow when ripe; style $\frac{1}{30}$ in. long; stigmas 3, longer than the style, capillary. Fl. B. I. v. 6, p. 607; Boeck. in Linnæa, v. 35 (1868) p. 597; C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 143 (exclud. syn.); Trim. Fl. Ceyl. v. 5, p. 31; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1140. *Cyperus distans*, Grah. Cat. p. 232 (*not* of Linn.); Dalz. & Gibs. p. 283.—Flowers: Sept.

Dalzell without locality in Herb. Kew.! DECCAN: Khandala, *Woodrow*.—DISTRIB. More or less throughout India.

30. **Cyperus eleusinoides,** *Kunth, Enum.* v. 2 (1837) p. 39. Perennial; rootstock woody, with short lateral shoots but no true stolons; stems 1½–4 ft. long, stout, triquetrous, with smooth angles. Leaves usually shorter than the stem, rigid, flat, reaching ⅓ in. broad with a stout midrib. Umbel erect, compound, with 5–8 stout, trigonous rays 4–8 in. long; spikes sessile or pedunculate, ½–1½ by ¼–⅓ in. in diam., green or brown, bracteolate, ascending, never divaricate; bracts 3 or 4, the longest sometimes more than 1 ft. long and ½ in. broad, leaf-

like; bracteoles filiform or subulate. Spikelets densely imbricate, $\frac{1}{4}$–$\frac{1}{3}$ by $\frac{1}{12}$–$\frac{1}{8}$ in., linear-oblong, erect, flat, 8–12-flowered; rhachilla slightly winged. Glumes $\frac{1}{8}$ by $\frac{1}{30}$ in., oblong, obtuse, apiculate, rounded on the back, about 5-nerved, with hyaline margins. Stamens 3; anthers small, oblong, obtuse. Nut $\frac{1}{16}$ in. long, oblong or obovoid-oblong, trigonous, apiculate, shortly stipitate, yellowish-brown; style scarcely $\frac{1}{30}$ in. long; stigmas, 3 twice as long as the style, capillary. Fl. B. I. v. 6, p. 608; Boeck. in Linnæa, v. 35 (1868) p. 596; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 142; Trim. Fl. Ceyl. v. 5, p. 37; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.—Flowers: Sept.

KONKAN: *Lambert!* DECCAN: Máwal (Poona districts), *Woodrow.* SIND: *Pinwill!*—DISTRIB. India (Kashmir, Moradabad, Darjeeling, Panjáb, W. Peninsula); Ceylon, Tropical Africa, China, Malaya, Queensland.

31. **Cyperus malaccensis,** *Lam. Illustr.* v. 1 (1791) p. 146. Glabrous, green or glaucescent; rhizome creeping, rather thick, clothed with dark brown scales. Stems 1½–3 ft. long, acutely triquetrous, $\frac{1}{6}$–$\frac{1}{5}$ in. in diam., much compressed. Leaves few, the uppermost 2–6 in. long, erect, green, ensiform, shortly caudate; sheaths often enclosing the stem. Umbel 2–6 in. in diam., simple, compound or congested, with 3–12 rays 1–3 in. long, the longer corymbosely branched at the apex; bracts 2–5, divaricate, subequal, spreading, flat, up to 6 by $\frac{1}{3}$ in.; umbellules simple; bracteoles small. Spikes of 4–10 spikelets; rhachis glabrous. Spikelets $\frac{3}{8}$–$\frac{5}{8}$ by $\frac{1}{16}$–$\frac{1}{12}$ in., linear, 20–40-flowered. Glumes $\frac{1}{10}$ by $\frac{1}{30}$ in., oblong, obtuse, scarcely keeled, straw-colored or pale brown. Stamens 3; anthers linear-oblong, not crested. Nut $\frac{1}{12}$ in. long, narrowly oblong, obtusely trigonous, tapering at either end, shortly apiculate; style $\frac{1}{30}$ in. long; stigmas 3, longer than the style, capillary. Fl. B. I. v. 6, p. 608; Boeck. in Linnæa, v. 35 (1868) p. 603; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 147; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1140; Watt, Dict. Econ. Prod. v. 2, p. 685. *Cyperus Pangorii,* Roxb. Hort. Beng. (1814) p. 6; Fl. Ind. v. 1 (1832) p. 202; Grah. Cat. p. 232.

KONKAN: Goa, *Woodrow*; Kalyan, *Woodrow.* SIND: *Pinwill!*—DISTRIB. India (Bengal, Circars, W. Peninsula); Persia, Malyan Peninsula, Japan, China, Borneo, Australia.

32. **Cyperus tegetiformis,** *Roxb. Hort. Beng.* (1814) p. 6. Stolons thick, rather long, round, with ovate dark-colored scales; stems 1½–5 ft. long, trigonous, often triquetrous near the top. Leaves scarcely any; sheaths many, up to 6 in. long. Umbel compound or decompound; rays 10–15, up to 5 in. long, slender; secondary rays about 8, reaching 2¼ in. long, terminated by spikes or corymbs of 4–16 spikelets; bracts short (rarely ½ the length of the umbel). Spikelets ½–1 in. long, 10–30-flowered, slightly compressed, pale straw-colored; rhachilla winged. Glumes $\frac{1}{12}$ in. long, elliptic, obtuse or emarginate; back rounded, 5–9-nerved; sides pale, marked with yellow or red. Stamens 3; anthers muticous, reddish. Nut $\frac{1}{20}$ in. long, oblong, trigonous, black; style shorter than the nut; stigmas 3, much longer than the style. Fl. B. I. v. 6, p. 612; C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 157; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1140; Watt, Dict. Econ. Prod. v. 2, p. 688.

KONKAN: Kalyan, *Woodrow.*—DISTRIB. India (Bengal, Assam, Bandelkand, W. Peninsula); China, Japan.

Woodrow gives Kalyan as the habitat of the plant, but I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew. It is possible that the plant collected by Woodrow may have been *C. corymbosus*, which is scarcely separable from *C. tegetiformis* and which is also reported from Kalyan.

33. **Cyperus corymbosus,** *Rottb. Descrip. et Icon.* (1773) p. 42, t. 7, fig. 4. A tall glabrous rush-like herb; rhizome creeping, clothed with dark brown scales; root-fibres stout; stems 2–3 ft. long, reaching $\frac{1}{3}$ in. in diam., spongy, appearing pseudo-septate and somewhat articulate when dry, terete below, obscurely trigonous above. Leaves 0, or a short blade reaching 5 in. long terminating a long loose membranous sheath. Umbel compound, narrow; rays 6–8, erect or suberect, very unequal, the longest reaching 4 in. long; secondary rays terminated by spikes or corymbs of 4–8 very slender spikelets; bracts 3, rarely as long as the umbel, keeled, green; bracteoles setaceous. Spikelets variable in length, $\frac{1}{4}$–1 by $\frac{1}{20}$–$\frac{1}{16}$ in., linear, subterete, rusty-brown; rhachilla slender, winged. Glumes erect, closely appressed to the rhachilla, $\frac{1}{8}$ by $\frac{1}{30}$ in., oblong, obtuse, rounded and 3-nerved on the back; sides pale, nerveless, scarious. Stamens 3; anthers $\frac{1}{20}$ in. long, muticous, brownish-yellow. Nut $\frac{1}{16}$ in. long, narrowly obovoid, tapering towards the base, apiculate, trigonous; style $\frac{1}{30}$ in. long; stigmas thrice as long or longer. Fl. B. I. v. 6, p. 612; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 158; Trim. Fl. Ceyl. v. 5, p. 29; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1141; Watt, Dict. Econ. Prod. v. 2, p. 683. *Cyperus diphyllus*, Retz. Obs. fasc. 5 (1789) p. 11 (*not* of Benth.); Boeck. in Linnæa, v. 36 (1870) p. 272.

KONKAN: Kalyan, *Woodrow.*—DISTRIB. More or less throughout India; Ceylon, Tropical Africa, America. Used in S. India and Ceylon for mat-making and occasionally in Ceylon grown for that purpose.

34. **Cyperus tegetum,** *Roxb. Fl. Ind.* v. 1 (1832) p. 208. Glabrous; rhizome woody, stout, horizontal; root-fibres wiry, clothed with branched hairs; stems solitary or approximate, 2–4 ft. high, trigonous or triquetrous. Leaves usually short or 0, but sometimes with long leaves 1 ft. or more long, $\frac{1}{8}$–$\frac{3}{8}$ in. broad, linear, acuminate; sheaths long, lax. Umbel compound or decompound; rays many, 1–5 in. long; secondary rays bearing corymbs or spikes, each with 4–10 slender spikelets; bracts sometimes reaching 15 in. long by $\frac{1}{3}$ in. broad, erecto-patent, with a strong midrib and scaberulous margins which are usually recurved in dried specimens. Spikelets $\frac{3}{8}$–$\frac{3}{4}$ by $\frac{1}{10}$ in., 10–30-flowered, usually reddish-brown; rhachilla with large ovate acute dark-brown deciduous wings. Glumes $\frac{1}{8}$ by $\frac{1}{30}$ in., narrowly oblong, obtuse, 3–5-nerved on the back, scarcely keeled; sides red-brown, nerveless, with narrow scarious margins incurved in dried specimens. Stamens 3; anthers $\frac{1}{30}$ in. long, yellowish-brown, muticous or minutely crested. Nut $\frac{1}{16}$ in. long, narrowly obovoid-oblong, tapering towards the base, minutely apiculate, trigonous, yellowish-brown; style $\frac{1}{25}$ in. long; stigmas 3, longer than the style, capillary, not or scarcely exserted. Fl. B. I. v. 6, p. 613; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 160; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1141; Watt, Dict. Econ. Prod. v. 2, p. 688. *Cyperus dehiscens*, Nees, in

Linnæa, v. 9 (1835) p. 286 (*nomen nudum*); Kunth, Enum. v. 2 (1837) p. 56; Trim. Fl. Ceyl. v. 5, p. 30. *Papyrus dehiscens*, Nees, in Wight, Contrib. (1834) p. 89.—Flowers: Sept.

KONKAN: *Cooke*! DECCAN: Lanoli, *Garade*! SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, Tropical Africa; cultivated in Mauritius.

Much employed in Calcutta for the manufacture of mats, which are sometimes imported into Europe.

35. **Cyperus bulbosus,** *Vahl, Enum.* v. 2 (1806) p. 342. Glabrous, stoloniferous; stolons ½–2½ in. long, filiform, with bulbils formed close to the ends of the stolons; bulbils when ripe ovoid, ⅜ by ⅕ in., coated with a thick striate black integument which ultimately splits irregularly into lanceolate segments; stem 4–12 in. long, slender, trigonous, arising from a bulb, clothed at the base with black coriaceous scales. Leaves coming off at some distance from the base, below the middle of the stem and usually longer than it, reaching ⅛ in. broad, tapering to a fine point at the apex, spreading and recurved; sheaths very long, membranous. Inflorescence a head of umbels formed of slender alternate spikes each bearing 3–12 spikelets, the lower distant from the upper; bracts 3, very unequal, filiform, the longest 3–4 in. long. Spikelets ⅜–⅝ by 1/12–1/16 in., compressed, red, 8–24-flowered; rhachilla with persistent elliptic wings. Glumes ⅛ in. long, oblong, slightly mucronulate, cymbiform, membranous, 7–11-nerved; the sides bright red with hyaline margins in the lower part. Stamens 3; anthers 1/16 in. long, linear, subacute, yellow. Nut 1/16 in. long, obovoid, obtuse, triquetrous, black. Fl. B. I. v. 6, p. 611; Dalz. & Gibs. p. 284; Trim. Fl. Ceyl. v. 5, p. 22; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431. *Cyperus jeminicus*, Retz. Obs. fasc. 4 (1786) p. 11; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 175 (*not* of Rottb.); Watt, Dict. Econ. Prod. v. 2, p. 685.—Flowers: Dec.

Sandy shores near the sea, *Dalzell & Gibson*. SIND: Hydrabad, *Woodrow*; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (W. Peninsula); Beluchistan, Ceylon, Tropical Africa, and Australia.

The bulbs are used as flour in times of scarcity and eaten roasted or boiled. When roasted they have the flavor of potatoes and would be valuable for food, but that they are so small. See Watt, Dict. Econ. Prod. l. c.

36. **Cyperus rotundus,** *Linn. Sp. Pl.* (1753) p. 45. Glabrous; stolons elongate, slender, 4–8 in. long, bearing hard ovoid tunicate black fragrant tubers ⅓–1 in. in diam.; root-fibres clothed with flexuous hairs; stems subsolitary, 4–30 in. long, triquetrous at the top, sometimes tuberous at the base. Leaves shorter or longer than the stem, narrowly linear, ⅛–⅓ in. broad, finely acuminate, flat, 1-nerved. Umbel simple or compound; rays 2–8, the longest reaching 3 in. long, bearing short spikes of 3–10 slender spreading red-brown spikelets [the inflorescence sometimes contracted into a head, occasionally (*fide* C. B. Clarke) of only one spikelet]; bracts 3, variable in length, the longest reaching 6 in. long, but sometimes abbreviated and much shorter than the head. Spikelets variable in length, ⅝–1½ by 1/10 in., linear, subacute, red-brown, 10–50-flowered, compressed; rhachilla with hyaline wings. Glumes ⅛–⅙ in. long, oblong, obtuse or slightly apiculate; back reddish-brown, 3–7-nerved; sides, margins, and tip hyaline. Stamens 3; anthers 1/10 in. long. Nut 1/16 in. long, broadly obovoid, trigonous, greyish-black;

style $\frac{1}{16}$ in. long; stigmas 3, elongate, reaching $\frac{1}{6}$ in. long, much exserted. Fl. B. I. v. 6, p. 614; Grah. Cat. p. 231; Dalz. & Gibs. p. 283; Boeck. in Linnæa, v. 36 (1870) p. 283; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 167; Trim. Fl. Ceyl. v. 5, p. 35; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1141; Watt, Dict. Econ. Prod. v. 2, p. 686.—Flowers: Sept.–Nov. VERN. *Moth*; *Motha*; *Nagar-motha*.

DECCAN: Poona, *Jacquemont*, 382!, *Bhagvat*!; Lanoli, *Woodrow*. SIND: *Bhola Puran*, 25!; Bhubak, *Woodrow*.—DISTRIB. Throughout India; Ceylon, most hot countries.

A very troublesome weed of cultivation, eradicated with difficulty owing to the stolons becoming woody. The tubers are roasted and pounded, and are used in native medicine and also for giving an aroma to certain fabrics. The fragrant sticks burnt in Hindu houses contain a portion of the powder.

37. **Cyperus tuberosus,** *Rottb. Descrip. et Icon.* (1773) p. 28, t. 7, fig. 1. Perennial; rhizome creeping, woody; stolons elongate, not tuberiferous; root-fibres filiform, covered with branched hairs; stems 2–4 ft. long, slender, trigonous with tuberous base. Leaves mostly radical, usually shorter than the stem, up to $\frac{1}{6}$ in. broad, with smooth margins. Umbel compound; primary rays few or many, slender, spreading, reaching 6 in. long; secondary rays terminating in 4–8 approximate spreading spikelets; bracts 3–4, the longest 1–2 ft. long with smooth margins. Spikelets $\frac{1}{2}$–$\frac{3}{4}$ in. long, reddish-brown, somewhat turgid along the median line, 16–24-flowered; rhachilla slender, with hyaline wings. Glumes suberect, reaching $\frac{1}{6}$ in. long, oblong-lanceolate, apiculate, keeled; the back reddish-brown, 3–5-nerved, the sides hyaline. Stamens 3; anthers narrow, muticous, yellowish-brown. Nut $\frac{1}{16}$ in. long, broadly obovoid, tapering towards the base, umbonate, granulate, trigonous, grey; style reaching $\frac{1}{16}$ in. long; stigmas 3, capillary, $\frac{1}{8}$–$\frac{1}{6}$ in. long. Not distinguishable from *Cyperus rotundus* by any good characters and it might well be united with it. Fl. B. I. v. 6, p. 616; Boeck. in Linnæa, v. 36 (1870) p. 285 (exclud. Cape plants and description of nut); Trim. Fl. Ceyl. v. 5, p. 33; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1141. *Cyperus tenuiflorus*, Roxb. Fl. Ind. v. 1 (1832) p. 199; Dalz. & Gibs. p. 284. *C. rotundus* var. *procerula*, C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 172.

KONKAN: *Law*!; Matheran, *Woodrow*; Thana, *Woodrow*. DECCAN: Poona, *Woodrow*.—DISTRIB. India (C. Bengal, W. Peninsula); Ceylon, Mauritius, Australia.

38. **Cyperus exaltatus,** *Retz. Obs.* fasc. 5 (1789) p. 11. A large glabrous herb; stolons 0; root-fibres stout; stems 3–6 ft. long, obtusely trigonous. Leaves few, longer or shorter than the stem, linear, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, finely acuminate, 1-nerved, multistriate, with more or less scaberulous margins. Umbel compound; rays 5–10, sometimes reaching 6 in. long, spreading, bearing spikes $\frac{3}{4}$–2 in. long of 20–40 rather distant short spikelets; bracts 3–6, leaf-like, the longest up to 2 ft. long. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ by $\frac{1}{16}$ in., ascending, narrowly elliptic-lanceolate, chestnut-brown, much compressed, 8–16-flowered; rhachilla with narrow peristent wings. Glumes $\frac{1}{12}$ in. long, closely imbricate, ovate-oblong, mucronate; back green, obscurely 3-nerved; sides chestnut-brown, not or scarcely nerved, the margins not or sometimes very narrowly scarious. Stamens 3; anthers $\frac{1}{25}$ in. long, yellow, muticous. Nut $\frac{1}{30}$ in. long, ellipsoid, tapering

to both ends, trigonous, brown or yellow; style $\frac{1}{20}$ in. long; stigmas 3, rather shorter than the style, capillary, exserted. Fl. B. I. v. 6, p. 617; Boeck. in Linnæa, v. 36 (1870) p. 319; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 186; Trim. Fl. Ceyl. v. 5, p. 32; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1141; Watt, Dict. Econ. Prod. v. 2, p. 684. *Cyperus umbellatus*, Roxb. Fl. Ind. v. 1 (1832) p. 205; Dalz. & Gibs. p. 284.—Flowers: Sept.

KONKAN: Karjat, *Woodrow*. DECCAN: *Dalzell & Gibson*; Lanoli, *Woodrow*. S. M. COUNTRY: Dambal (Dharwar districts), *Dalzell*!—DISTRIB. India (Panjáb, W. Peninsula); Ceylon, Tropical Africa, Indo-China, Australia.

VAR. *dives*, C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 187. Spikelets more turgid, yellow or golden-yellow, shining, horizontally spreading; glumes with scarious margins. Fl. B. I. v. 6, p. 617. *Cyperus dives* (sp.), Delile, Fl. Egypte (1812) p. 149, t. 4, fig. 3.

SIND: *Pinwill*!—DISTRIB. India (Bengal); Africa.

39. **Cyperus digitatus,** *Roxb. Hort. Beng.* (1814) p. 81. Perennial, glabrous; rhizome stout, woody, creeping; stolons 0; root-fibres stout. Stems 1–4 ft. long, trigonous or triquetrous above, with smooth angles. Leaves longer or shorter than the stem, $\frac{1}{2}$–$\frac{2}{3}$ in. broad, flat, coriaceous, multistriate, with scaberulous margins. Umbel very large, broad, up to 12 in. in diam., simple or compound; rays 4–10, trigonous, 2–6 in. long, terminated by stellately spreading sessile or cylindric spikes of unequal length, loosely set all round with innumerable horizontally spreading spikelets; bracts 3–6, leaf-like, the longest reaching sometimes 1 ft. long or more; bracteoles very slender; spikes 1–$1\frac{1}{2}$ by $\frac{3}{8}$–$\frac{1}{2}$ in., sessile or a few pedicellate. Spikelets $\frac{1}{8}$–$\frac{1}{4}$ by $\frac{1}{20}$ in., subterete, acute, 12–20-flowered, spreading horizontally, yellowish-brown; rhachilla with lanceolate acute scarious deciduous wings. Glumes $\frac{1}{16}$ by $\frac{1}{40}$ in., with rounded shortly cuspidate tip; back chestnut-brown, somewhat obscurely 3-nerved; sides hyaline. Stamens 3; anthers linear-oblong, not crested. Nut $\frac{1}{20}$ in. long, ellipsoid, tapering at both ends, straight or slightly curved, trigonous, yellowish; style $\frac{1}{30}$ in. long; stigmas 3, slightly longer than the style, capillary. Fl. B. I. v. 6, p. 618; Trim. Fl. Ceyl. v. 5, p. 36; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1141. *Cyperus Neesii*, Boeck. in Linnæa, v. 36 (1870) p. 315. *Cyperus auricomus*, C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 188.—Flowers: Sept.

KONKAN: *Law*! DECCAN: Lanoli, *Woodrow*; Poona, *Woodrow*, 204! S. M. COUNTRY: Londa, *Cooke*!—DISTRIB. India (E. Bengal, Assam, Pegu, Moradabad, Sikkim, W. Peninsula); Ceylon, Ethiopia, China, Malaya, Oceania.

40. **Cyperus Clarkei,** *T. Cooke.* Rootstock tuberous; stolons elongate, $\frac{1}{25}$ in. in diam., clothed with oblong-lanceolate striate pale-brown scales; stems 3–8 in. long, thick, trigonous, from a bulbous base. Leaves longer or shorter than the stem, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, linear, very acute; lower sheaths much inflated, striate, brown. Umbel simple, with very short rays, or subcapitate; spikes 5–8, cylindric, dense, pale, $\frac{1}{2}$–$\frac{3}{4}$ by $\frac{1}{4}$–$\frac{3}{8}$ in.; bracts 5–7, leaf-like, the longest reaching 6 in. long. Spikelets $\frac{1}{3}$–$\frac{1}{2}$ in. long, densely packed, spreading nearly at right angles, bearing 1 nut. Nut-bearing glumes ovate, acute, multistriate, straw-colored.

Stamens 3, with long filaments. Nut $\frac{1}{12}$–$\frac{1}{10}$ in. long, ellipsoid, trigonous, brown; style $\frac{1}{25}$ in. long; stigmas rather shorter than the style. *Mariscus bulbosus*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 620; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431. *Kyllinga bulbosa*, Kœnig, in Vahl, Enum. v. 2 (1806) p. 376 (*in note*).—Flowers: Oct.

S. M. Country: *Woodrow*, 36!; Badami, *Woodrow*; Dharwar, *Woodrow*. Kanara: N. Kanara, *Young* ex *C. B. Clarke*.—Distrib. India (W. Peninsula).

As the name *Cyperus bulbosus* is preoccupied by Vahl's plant [Vahl, Enum. v. 2, (1806) p. 342], I have had to find a new name for this, and, as it was first described by Mr. C. B. Clarke, I have adopted the name *C. Clarkei*.

41. **Cyperus konkanensis,** (*nov. sp.*) *T. Cooke*. Rhizome short; stolons 0 on the only specimen seen; root-fibres stout; stems reaching 30 in. long from a thickened base, stout, trigonous, striate, smooth, about $\frac{1}{2}$ in. in diam. at the base. Leaves 1$\frac{1}{2}$–2 ft. long; sheaths reaching 6–10 in. long, striate. Inflorescence reaching 9 in. long. Umbel compound, with 4–6 long rays up to 7 in. long, and some sessile spikes at its base; secondary umbels with 3–4 sessile spikes of many widely spreading spikelets; bracts of primary umbel $\frac{1}{2}$–2 ft. long, up to $\frac{1}{2}$ in. broad, leaf-like; bracts of secondary umbel $\frac{1}{2}$–1 in. long, filiform; bracteoles $\frac{1}{12}$–$\frac{1}{4}$ in. long, lanceolate or aristate from a lanceolate base. Spikelets exceeding $\frac{1}{4}$ in. long, lanceolate, subterete, $\frac{1}{30}$ in. in diam., somewhat distantly placed along the rhachis, shining, straw-colored. Lowest glume $\frac{1}{10}$ in. long, oblong, obtuse, scarious, with parallel nerves. Upper glumes $\frac{1}{4}$ in. long, twisted, wrapped round the nut, deeply striate to the margins which are not hyaline. Stamens 3; anthers $\frac{1}{16}$ in. long, narrow, pointed, reddish-brown. Nut $\frac{1}{6}$ by $\frac{1}{30}$ in., oblong, trigonous, pale-brown; style $\frac{1}{10}$ in. long; stigmas 3, reaching $\frac{1}{4}$ in. long, much exserted. *Mariscus Sieberianus*, Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431 (*not* of Nees). ? *Mariscus umbellatus*, Dalz. & Gibs. p. 285.

Konkan: Western Ghâts, *Woodrow*, 34!

There is but one sheet from the Bombay Presidency in Herb. Kew. collected by Woodrow, containing 1 specimen only. Mr. Clarke has labelled the specimen *Mariscus Sieberianus* var. *subcomposita* (forma *gigantea*), and in a pencilled note on the sheet remarks ? *Sp. nova*. It is a much larger and coarser plant than the var. *subcomposita* alluded to, the spikelets are not closely packed but rather distant, the glumes are distinctly twisted and conspicuously striate up to the non-hyaline margins.

42. **Cyperus paniceus** (*Mariscus*), *Vahl, Enum.* v. 2 (1806) p. 373. Var. **Roxburghiana,** *C. B. Clarke, in Hook. f. Fl. B. I.* v. 6 (1893) p. 621 (under *Mariscus*). Perennial; rootstock small, horizontal, stoloniferous; stolons slender, rigid; stems up to 2 ft. long, trigonous, smooth. Leaves long, narrow, 1-nerved. Umbel simple; rays reaching sometimes 2 in. long; spikes reaching 1 by $\frac{1}{4}$–$\frac{1}{3}$ in., cylindric; the rhachis closely clothed with the persistent lower glumes of the spikelets; bracts 5–7, the longest reaching 10 or 11 in. long, leaf-like. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. long, consisting of 4 glumes, the 2 lowest empty, scarious, the third fertile, the fourth empty, lanceolate, with a long subulate tip; rhachilla winged above the articulation. Nut-bearing glume $\frac{1}{3}$–$\frac{1}{6}$ in. long, lanceolate-subulate, convolute, wrapped round the upper glume and nut; back strongly 3-nerved; sides scarcely striate, often dotted with brown spots, and with narrowly hyaline margins. Stamens 3; anthers long, slender. Nut nearly $\frac{1}{8}$ in. long, slightly curved, oblong-ellipsoid, attenuated at

each end, trigonous, pale-brown; style $\frac{1}{40}$ in. long; stigmas 3, longer than the style, capillary. *Mariscus cyperinus*, Nees, in Wight, Contrib. (1834) p. 90, var. *α* (*not* of Vahl). *Scirpus echinatus*, Linn. Sp. Pl. (1753) p. 50. *Kyllinga umbellata*, Roxb. Icon. ined. t. 191.

Konkan: *Law*!—Distrib. More or less throughout India; Ceylon, Java.

There is but one sheet in Herb. Kew. from the Bombay Presidency ticketed "Konkan, *Law*," containing two specimens (without leaves) which consist each of a piece of the upper portion of a stem less than 3 in. long, carrying spikes and bracts.

43. **Cyperus pennatus,** *Lam. Illust.* v. 1 (1791) p. 144. Perennial; rootstock tuberous, woody, stoloniferous; root-fibres very stout; stem 2–3 ft. by $\frac{1}{3}$ in. or more in diam., stout, trigonous, smooth. Leaves longer than the stem, sometimes reaching 4 ft. long by $\frac{1}{3}$ in. broad, coriaceous, sometimes septato-punctate, the margins and keel scaberulous. Umbel compound, 4–8 in. in diam., with 4–8 stout rays 1–3 in. long and short secondary rays with spreading cylindric sessile spikes $\frac{1}{2}$–1 in. long, covered with stout horizontally spreading spikelets; bracts 4–6, leaf-like, up to 16 in. long. Spikelets $\frac{1}{4}$–$\frac{5}{16}$ in. long, reddish-brown or straw-colored, oblong-lanceolate, acute, subterete, 3–6-flowered; rhachilla with short winged internodes. Glumes closely imbricate, concave, ovate, subobtuse, the nut-bearing ones reaching $\frac{1}{6}$ in. long, dorsally rounded, spotted with brown; nerves many, slender, the margins narrowly hyaline. Stamens 3; anthers small, oblong. Nut $\frac{1}{16}$ in. long, ellipsoid, trigonous, black when ripe; style $\frac{1}{20}$ in. long; stigmas 3, longer than the style. C. B. Clarke, in Journ. Linn. Soc. v. 21, p. 194. *Cyperus canescens*, Boeck. in Linnæa, v. 36 (1870) p. 340. *Mariscus albescens*, Gaud. in Freyc. Voy. Bot. (1826) p. 415; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 623; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain. Beng. Pl. p. 1146.—Flowers: Oct.

Konkan: *Cooke*!; Máhad, *Woodrow*. Deccan: Lanoli, *Woodrow*.—Distrib. India (Bengal, Birma, W. Peninsula); Ceylon, Ethiopia, China, Malaya, Oceania.

Cyperus stuppeus, Forst. Prodr. (1786) p. 89, should perhaps as the older name have precedence.

44. **Cyperus dilutus,** *Vahl, Enum.* v. 2 (1806) p. 357. Perennial, glabrous; rootstock short; stem 1–4 ft. long, obtusely trigonous, smooth. Leaves as long as or longer than the stems, up to $\frac{1}{2}$ in. broad, coriaceous or spongy, septato-punctate, the margins and keel scaberulous. Umbel large, decompound; rays many, trigonous, up to 6 in. long, simple or bearing secondary or tertiary umbellules, the ultimate rays terminated by globose heads (contracted spikes) $\frac{3}{4}$–1 in. in diam., of innumerable narrow stellately spreading spikelets; bracts many, long and broad in large specimens, few and narrow in small ones, leaf-like. Spikelets $\frac{1}{3}$–$\frac{1}{2}$ in. long, slender, terete, red-brown, shining, bearing 4–14 nuts; rhachilla very slender, with internodes about $\frac{1}{12}$ in. long, and oblong persistent wings. Glumes reaching $\frac{1}{6}$ by $\frac{1}{30}$ in., loosely imbricate, faintly nerved, straight, oblong or oblong-lanceolate, obtuse, dorsally rounded, the margins not hyaline. Stamens 3; anthers $\frac{1}{20}$ in. long, reddish-brown, muticous. Nut (not including beak) reaching $\frac{1}{12}$ in. long, oblanceolate-oblong, narrow, acutely trigonous, stipitate, distinctly beaked; style shorter than the nut; stigmas 3, exserted. Boeck. in Linnæa, v. 36 (1870) p. 354; C. B. Clarke, in Journ. Linn. Soc. v. 21 (1884) p. 193. *Cyperus spinulosus*, Roxb. Fl. Ind. v. 1 (1832) p. 203.

Mariscus microcephalus, Presl, Rel. Haenk. (1830) p. 182; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 624.

SIND: *Pinwill!*—DISTRIB. More or less throughout India; Ceylon, Mauritius, China, Malaya.

EXCLUDED SPECIES.

CYPERUS GLABER, Linn. Mantiss. (1771) p. 179. Spikelets tinged with red; glumes muticous or nearly so; nut obovoid, obtuse, minutely conic-apiculate (otherwise as *C. compressus*). C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 606.
There is no specimen of *C. glaber* in the Indian bundles in Herb. Kew.

CYPERUS ESCULENTUS, Linn. Sp. Pl. (1753) p. 45. Stolons long, slender, bearing tubes; spikelets yellow or brownish; glumes plicate-striate over nearly their whole breadth. C. B Clarke, in Hook. f. Fl. B. I. v. 6, p. 616; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431.
There is in Herb. Kew. a solitary specimen from *Jacquemont* (No. 277) which, according to the ticket on it, was collected between Ellora and Poona. As Ellora is in the Nizam's dominions, and at least 120 miles from Poona, and as no precise locality has been given, the existence of the plant in the Bombay Presidency is extremely doubtful, especially as no Bombay botanists have apparently met with it.

2. KYLLINGA, Rottb.

Perennial herbs tufted or with a creeping rhizome; stem trigonous, leafy below only, terminated by 1–3 sessile capitate spikes. Leaves narrow. Spikelets minute, green, strongly laterally compressed, 1–2-flowered, densely packed on short sessile oblong or globose involucrate spikes; rhachis short, naked after the fall of the spikelets, or squarrosely covered with the more or less persistent lowest glumes; rhachilla very minute, disarticulating above the two lowest glumes. Glumes 4, distichous, the two lowest hyaline, empty, much shorter than the third and fourth, the third and fourth much the largest, often green and speckled with brown, subequal or the upper longest, unequal-sided, keeled; keel sometimes winged, apiculate or cuspidate. Stamens 1–3; anthers long or short. Ovary suborbicular; style long or short, not swollen at the base; stigmas 2, linear. Fruit a strongly laterally compressed smooth nut, sometimes apiculate by the persistent style-base.—DISTRIB. All hot and temperate regions except Europe; species 33.

Nut-bearing glume winged in upper half of keel; rhizome creeping, elongate ..... 1. *K. monocephala.*
Nut-bearing glume not winged in upper half of keel; rhizome very short..... 2. *K. triceps.*

1. **Kyllinga monocephala,** *Rottb. Descrip. et Icon.* (1773) p. 13, t. 4, fig. 4. Glabrous or nearly so; rhizome creeping, elongate; stems 3–12 in. high, usually solitary, erect. Leaves shorter than the stem, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, linear, acute with a strong midnerve. Spikes solitary (rarely 2–3), the lateral when present very small, the middle spike $\frac{1}{4}$–$\frac{1}{3}$ in. in diam.; rhachis naked or pitted after the fall of the spikelets, the lowest glumes mostly deciduous; floral bracts 3–4, very long and narrow, similar to the leaves. Spikelets $\frac{1}{10}$ in. long, 1-flowered. Two outer glumes hyaline, the lowest glume narrowly ovate-lanceolate, $\frac{1}{6}$ in. long, the second glume broadly ovate, obtuse; glumes 3 and 4 green, often sparsely speckled with brown, falcately incurved, acuminate, the upper

slightly the longer, but no. 3 the broader, the keel dorsally winged about the middle, the wings spinulose, sometimes obscurely developed. Anthers small. Nut obovoid or oblong, compressed, rather more than half as long as the glume, pale reddish-brown; style rather more than $\frac{1}{30}$ in. long; stigmas 2, filiform, as long as the style. Fl. B. I. v. 6, p. 588; Grah. Cat. p. 232; Dalz. & Gibs. p. 285; Trim. Fl. Ceyl. v. 5, p. 44; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430; Prain, Beng. Pl. p. 1135.

S. M. COUNTRY: Londa, *Cooke*!—DISTRIB. Throughout India; Ceylon, hot and warm temperate regions of the Old World except the Mediterranean.

2. **Kyllinga triceps,** *Rottb. Descrip. et Icon.* (1773) p. 14, t. 4, fig. 6. Glabrous; rhizome very short or 0; stems 2–9 in. long, tufted. Leaves as long as (rarely longer) but usually shorter than the stem, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, linear, acute. Spikes ovoid-oblong or subcylindric, usually 3 together (rarely solitary), the middle one the largest, $\frac{1}{6}$–$\frac{1}{4}$ in. in diam.; rhachis clothed, after the fall of the spikelets, with the persistent lower glumes; bracts beneath the head 3–4, leaf-like, up to 3 in. long. Two lower glumes hyaline, the lowest lanceolate, acuminate, $\frac{1}{20}$ in. long, the second lanceolate or suborbicular, the third and fourth herbaceous, membranous, green not speckled with brown, ovate-lanceolate, obtusely apiculate, strongly nerved, the uppermost (fourth) rather the longest, $\frac{1}{12}$–$\frac{1}{10}$ in. long. Stamens 2. Nut oblong or ellipsoid-oblong, yellowish-brown, much compressed, $\frac{1}{16}$ in. long; style with 2 filiform stigmas, together nearly as long as the nut. Fl. B. I. v. 6, p. 587; Grah. Cat. p. 232; Wight, Contrib. p. 91; Trim. Fl. Ceyl. v. 5, p. 45; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 430.—Flowers: Sept.

DECCAN: Poona, *Jacquemont*, 345!, *Woodrow*. SIND: *Pinwill*!—DISTRIB. India (N.-West, Sind, Bengal, Birma); Ceylon, Africa, China, Australia.

3. COURTOISIA, Nees.

Herbs with erect simple stems, leafy only near the base. Leaves grass-like. Spikelets compressed, in globose spikes; rhachilla disarticulating above the two lowest glumes. Glumes persistent, I and II empty; 1–3 above them hermaphrodite, nut-bearing, winged on the keel; uppermost sterile or empty. Stamens 3; anthers oblong. Ovary ovoid; style short, persistent; stigmas 3, linear, longer than the style. Fruit a trigonous nut with acute apex, continuous with the style.—DISTRIB. India, Africa, Madagascar; species 2.

1. **Courtoisia cyperoides,** *Nees, in Linnæa*, v. 9 (1835) p. 286. Annual, glabrous, whole plant of a yellowish hue; root fibrous; stems 3–16 in. long, cæspitose, slender, trigonous, striate, leafy towards the base. Leaves usually longer than the stems, linear, acute, $\frac{1}{10}$–$\frac{1}{5}$ in. broad. Umbel simple or compound, with 3–10 rays 1–3 in. long; secondary rays 3–5 up to 1 in. long, bearing dense globose yellowish-brown spikes composed of many short spikelets; bracts 3–7, leaf-like, 4–15 in. long; secondary bracts often $\frac{3}{4}$ in. long. Spikelets $\frac{1}{8}$ in. long, many, in globose heads $\frac{1}{4}$–$\frac{1}{2}$ in. in diam. Glumes boat-shaped, flattened, the fertile ones slightly mucronate, the keel with a continuous glistening wing along its whole length; sides not striate. Stamens 3; anthers

oblong. Nut rather more than $\frac{1}{8}$ in. long, narrow, trigonous, fusiform, tapering at both ends, almost beaked, chestnut-brown, granulate; style short, continuous with the nut; stigmas 3, filiform. Fl. B. I. v. 6, p. 625; Dalz. & Gibs. p. 285; Boeck. in Linnæa, v. 35 (1868) p. 434; Benth. in Hook. Icon. Pl. (1880) t. 1341; Nees, in Wight, Contrib. (1834) p. 92; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1147. *Kyllinga cyperoides*, Roxb. Fl. Ind. v. 1 (1832) p. 182; Grah. Cat. p. 232.

KONKAN: *Law*!

There is but one specimen in Herb. Kew. marked as above, and while Woodrow retains the plant in his list he does not indicate any locality where it is to be found. —DISTRIB. India (Sikkim, Assam, Bengal, Pegu, W. Peninsula); Tropical Africa, Madagascar.

4. **FIMBRISTYLIS,** Vahl.

Annual or perennial herbs; roots fibrous or woody; stolons 0; stems tufted. Leaves near the base of the stem, rarely reduced to sheaths, narrowly linear or filiform. Spikelets terete, angular or compressed, many-flowered, in a terminal umbellate or capitate inflorescence. Glumes imbricate spirally round the rhachilla, or the lower glumes distichous, glabrous (very rarely pubescent), deciduous, the lower 1–3 and sometimes the upper empty, the others 2-sexual; hypogynous bristles 0. Stamens 1–3; filaments flat; anthers linear, obtuse or acute, or subulately tipped. Ovary obovoid, somewhat flattened or trigonous; style long, base more or less dilated, flattened or slender, glabrous, pubescent or villous, wholly deciduous; stigmas 2 in the flattened, 3 in the trigonous ovaries, usually filiform and elongate. Fruit an obovoid biconvex or trigonous (very rarely cylindric) nut.—DISTRIB. Nearly all hot and warm regions, especially plentiful in S.E. Asia and N.E. Australia; species 125.

Stigmas 2.
- Spikelets solitary, terminating the stem (rarely 2 or 3 in *polythricioides*).
  - Leaves 0 or very short (see also *F. ferruginea*); nut subcylindric, curved ..... 1. *F. tetragona.*
  - Leaves like the stem; nut turbinate.
    - Nut sessile, yellow dotted with white spots ... 2. *F. polythricioides.*
    - Nut stipitate, snow-white with a brown patch on each face ..... 3. *F. schœnoides.*
- Spikelets umbellate or capitate.
  - Annuals (*F. diphylla* sometimes perennial).
    - Spikelets umbellate.
      - Nut with 6–9 broad trabeculate ribs; stamens 1–3 ..... 4. *F. dichotoma.*
      - Nut smooth; stamen 1 ..... 5. *F. æstivalis.*
    - Spikelets capitate ..... 6. *F. argentea.*
  - Perennials (*F. diphylla* sometimes annual).
    - Leaves 0 or very short; stamens 2–3 ..... 7. *F. ferruginea.*
    - Leaves many.
      - Glumes mucronate; stamens 1–3 ..... 8. *F. diphylla.*
      - Glumes with obtuse hyaline tips; stamens usually 2 ..... 9. *F. spathacea.*

Stigmas 3.
- Spikelets terete or polygonal, none of the glumes distichous.
  - Stems 6–24 in. long.

Style hairy; glumes acute, mucronate; rhachilla winged ..... 10. *F. quinquangularis.*
Style glabrous; glumes obtuse, not mucronate; rhachilla not winged ..... 11. *F. miliacea.*
Stems less than 6 in. long.
Inflorescence in a terminal head; stamens 3; nut globosely obovoid; style $\frac{1}{16}$ in. long ..... 12. *F. digitata.*
Inflorescence umbellate; stamen 1; nut narrowly obovoid; style $\frac{1}{25}$ in. long ..... 13. *F. Woodrowii.*
Spikelets compressed or trigonous; all or the lower glumes only distichous; bracts short in all.
Spikelet 1 (rarely 2) .... 14. *F. monostachya.*
Spikelets many, umbellate.
Leaves filiform ..... 15. *F. monticola.*
Leaves flat.
Style glabrous ..... 16. *F. complanata.*
Style pubescent ..... 17. *F. junciformis.*

1. **Fimbristylis tetragona,** *R. Br. Prodr.* (1810) p. 226. Perennial, glabrous; root-fibres stout; stems 6–24 in. long, tufted, slender, quadrangular, ribbed. Leaves 0, or the upper sheaths with an erect lanceolate acuminate limb; sheaths usually brown. Spikelet solitary, $\frac{1}{4}$–$\frac{3}{8}$ in. long, erect, ovoid-conic, terete, obtuse; lowest glume sometimes hardly bractiform, at others $\frac{1}{2}$ as long as the spikelet, coriaceous, deciduous; rhachilla thickly studded with deep tetragonal pits with raised edges. Glumes closely imbricate, $\frac{1}{5}$–$\frac{1}{6}$ in. long, broadly oblong or obovate-oblong, rounded at the apex, concave, embracing the nut, scarious, with a broad coriaceous central band. Stamens 2; filaments flattened, dark-brown (nearly black); anthers narrowly linear, muticous. Nut $\frac{1}{12}$ in. long (not including the style-base or the stalk), linear-oblong or subcylindric, narrow, tapering towards the base, slightly curved, with a long slender stalk, trabeculate with slender parallel ribs and minute cross bars, pale straw-colored (nearly white), deciduous with the glume; style villous, flattened, as long as the nut, with a large subpersistent conical compressed base; stigmas 2, short. Fl. B. I. v. 6, p. 631; Trim. Fl. Ceyl. v. 5, p. 48; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1150. *Fimbristylis cylindrocarpa,* Boeck. in Linnæa, v. 37 (1871) p. 7.—Flowers: Oct.

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks*!; Salsette, *Jacquemont,* 747! KANARA: *Law*! DECCAN: Hirdosi, *Woodrow*; Máwal (Poona districts), *Woodrow.*—DISTRIB. Throughout India (except the North-West); Ceylon, E. Asia, Australia.

2. **Fimbristylis polythricioides** (*Scirpus*), *Vahl, Enum.* v. 2 (1806) p. 248. Perennial, glabrous; root-fibres filiform; stems 2–10 in. long, filiform, leafy at the base, trigonous, striate. Leaves $\frac{1}{2}$ as long as the stem or longer, slender, wiry, acute, terete or trigonous, striate; sheaths glabrous or puberulous. Spikelet solitary, $\frac{1}{4}$ in. long, erect, oblong-ellipsoid, many-flowered; rhachilla stout, terete, deeply pitted. Glumes $\frac{1}{8}$ in. long, linear-oblong, cymbiform, subobtuse or acute, minutely apiculate, membranous, with a narrow central band, pale straw-colored or almost white. Stamens 1–3; filaments flattened, membranous, white. Nut $\frac{1}{16}$ in. long, turbinate, sessile, much compressed, subtruncate at the apex, biconvex, with acute margins, yellow, dotted with white spots; style $\frac{1}{20}$ in. long, slightly hairy, scarcely dilated at the base, deciduous; stigmas 2, as long as the style. Fl. B. I. v. 6, p. 632; Trim. Fl. Ceyl. v. 5, p. 49; Woodr.

in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1150. *Fimbristylis juncea*, Boeck. in Linnæa, v. 37 (1871) p. 4 (*not* of Rœm. & Schult.).—Flowers: Sept.–Oct.

KONKAN: Sion (Bombay), *Woodrow*!—DISTRIB. India (Bengal, Sundribans, W. Peninsula); Ceylon, Malacca.

3. **Fimbristylis schœnoides,** *Vahl, Enum.* v. 2 (1806) p. 286. A glaucous herb; rhizome 0, or rarely horizontal and very short; root-fibres slender; stems 4–18 in. long, tufted, slender (almost filiform), obtusely angled, striate. Leaves usually shorter but hardly broader than the stem, $\frac{1}{20}$ in. broad or less, narrowly linear, very acute, coriaceous, striate above, dotted beneath, with recurved spinulose margins; sheaths glabrous with membranous margins. Spikelets $\frac{1}{4}$–$\frac{1}{2}$ in. long, solitary or 2–5 in an irregular umbel, sessile or on slender pedicels; bracts 2, very variable, usually shorter than the spikelets [in one specimen from Khadkala (Deccan) collected by Woodrow there are 2 leaf-like bracts below the umbel which one of them exceeds]; rhachilla slender. Glumes deciduous, loosely imbricate, $\frac{1}{8}$–$\frac{1}{6}$ in. long and about as broad as long, orbicular, obtuse, shortly apiculate, very concave, membranous, with 5–7 slender central nerves, straw-colored or pale brown. Stamens 3; anthers acute. Nut $\frac{1}{16}$–$\frac{1}{12}$ in. long, turbinate, compressed, biconvex, rounded at the apex, smooth, shortly stipitate, snow-white with a brown patch in the centre of each face; style $\frac{1}{16}$ in. long, the upper half villous, the base enlarged, cylindric or subglobose; stigmas 2, short. Fl. B. I. v. 6, p. 634; Boeck. in Linnæa, v. 37 (1871) p. 5; Trim. Fl. Ceyl. v. 5, p. 49; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1150.—Flowers: Sept.

KONKAN: *Woodrow*. DECCAN: Khadkala near Lanoli, *Woodrow*! SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, China, Malaya, Australia.

4. **Fimbristylis dichotoma,** *Vahl, Enum.* v. 2 (1806) p. 287. Annual; root-fibres slender; stems 2–10 in. long, tufted, filiform, striate, smooth. Leaves usually shorter than the stems, very narrow, $\frac{1}{30}$ in. broad, tapering to a fine point, smooth; sheaths softly villous. Umbel laxly compound or decompound, 1–2 in. in diam.; rays few or many, up to 1 in. long, suberect; bracts filiform, shorter or longer than the umbels. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ by $\frac{1}{16}$–$\frac{1}{12}$ in., somewhat angular from the acute keels to the glumes, ellipsoid, many-flowered; rhachilla stout, angular, with large pits. Glumes loosely imbricate, all, or all but the lowest fertile, $\frac{1}{16}$ by $\frac{1}{30}$ in., ovate, reddish-brown, 1–3-nerved on the back, the midnerve forming a conspicuous acute green keel which is prolonged into a cuspidate point. Stamens 1–3; anthers small, obtuse. Nut $\frac{1}{40}$–$\frac{1}{30}$ in. long, broadly turbinate, minutely stipitate, umbonate, compressed, biconvex, with 6–9 broad trabeculate ribs, pale straw-colored or almost white; style $\frac{1}{20}$ in. long, densely villous in the upper part, or sometimes all over, with a small globose bulbous base; stigmas 2, recurved. Fl. B. I. v. 6, p. 635; Boeck. in Linnæa, v. 37 (1871) p. 12; Trim. Fl. Ceyl. v. 5, p. 50; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1151.—Flowers: Oct.–Apr.

KONKAN: *Dalzell, Lambert*!, *Stocks*! DECCAN: Khandala, *Woodrow*. GUJARAT: Bodeli, *Woodrow*. SIND: *Stocks*, 1204!—DISTRIB. Throughout India especially in rice-fields; Ceylon, warm regions of the Old World.

5. **Fimbristylis æstivalis,** *Vahl, Enum.* v. 2 (1806) p. 288. An annual glaucous herb, more or less slightly pubescent; roots fibrous; stems 2–8 in. long, erect, trigonous, filiform, striate. Leaves shorter than the stem, very narrow, acute. Umbel compound or subdecompound, lax, with many slender erect rays; bracts 3–5, the longest usually much exceeding the umbel, narrowly linear, acute, leaf-like, pubescent. Spikelets $\frac{1}{5}$–$\frac{1}{6}$ by $\frac{1}{12}$–$\frac{1}{10}$ in., elliptic-oblong, brown, the two lowest glumes empty, bract-like, $\frac{1}{10}$ in. long, longer than the others, with a hispid keel which is produced into a long recurved mucro, and usually with hyaline margins; rhachilla prominently scarred. Glumes (fertile) $\frac{1}{18}$ in. long, oblong, puberulous, suberect; back strongly keeled, the keel produced into a stout mucro about $\frac{1}{40}$ in. long, which is often pubescent; sides streaked with reddish-brown, the margins not hyaline. Stamen 1. Nut scarcely $\frac{1}{50}$ in. long, orbicularly obovoid, much compressed, biconvex, with an acute margin, narrowed to the base, straw-colored, smooth, slightly umbonate; style about $\frac{1}{40}$ in. long, slightly pubescent, with a bulbous base; stigmas 2, recurved, nearly as long as the style. Fl. B. I. v. 6, p. 637; Boeck. in Linnæa, v. 37 (1871) p. 11; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1151.—Flowers: Sept.–Dec.

KONKAN: Matheran, *H. M. Birdwood, Woodrow.* DECCAN: Máwal (Poona districts), *Woodrow*; Kanara, *Law*!—DISTRIB. More or less throughout India, S. and E. Asia, Australia. Sir Joseph Hooker (Trim. Fl. Ceyl. v. 5, p. 51) considers the Ceylon plant a distinct species and not conspecific with Vahl's plant, which latter he says has not hitherto been found in Ceylon.

6. **Fimbristylis argentea,** *Vahl, Enum.* v. 2 (1806) p. 294. A densely tufted glaucous glabrous annual; root-fibres filiform; stems many, 4–8 in. long, filiform, trigonous, striate. Leaves shorter and often more slender than the stem, flexuous, smooth, canaliculate, acute; sheaths short, glabrous. Spikelets $\frac{1}{6}$–$\frac{3}{8}$ in. long, 3–20, sessile, forming a terminal globose head, cylindric-oblong, terete, obtuse, many-flowered; bracts 3–4, much longer than the head, reaching 3 in. long. Glumes $\frac{1}{18}$ in. long, closely imbricate, ovate, obtuse, not cuspidate; back with a strong green keel, obscurely 3-nerved; sides brown, with hyaline margins. Stamen 1. Nut $\frac{1}{50}$ in. long, orbicularly obovoid, compressed, biconvex, shortly stipitate, with narrow acute margins, straw-colored, quite smooth, umbonate; style $\frac{1}{30}$ in. long, minutely hairy in the upper part, with a bulbous base; stigmas 2, shorter than the style. Fl. B. I. v. 6, p. 640; Dalz. & Gibs. p. 287; Boeck. in Linnæa, v. 37 (1871) p. 8; Prain, Beng. Pl. p. 1151. *Scirpus argenteus*, Rottb. Descrip. et Icon. (1773) p. 51, t. 17, fig. 6; Grah. Cat. p. 232.

This is given for the Bombay Presidency on the authority of Dalzell & Gibson (Bo. Fl. l. c.), who assign no locality to the plant. Woodrow does not include it in his list of plants and there are no specimens from the Bombay Presidency in Herb. Kew. The plant seems to be tolerably common in Madras.—DISTRIB. India (Bengal, W. Peninsula); Ceylon, Mauritius.

7. **Fimbristylis ferruginea,** *Vahl, Enum.* v. 2 (1806) p. 291. ? Perennial; rhizome 0 or scarcely any; root-fibres stout and slender; stem 1–2½ ft. long, subtrigonous. Leaves 0 or few, short, very narrow, glabrous or hairy; sheaths pubescent, thin. Umbels simple or subcompound, of few spikelets; bracts shorter than the umbel, striate,

slender. Spikelets $\frac{3}{8}$ by $\frac{1}{8}$ in., ellipsoid, pale reddish-brown, pubescent, the lowest spikelets usually bractiform, variable, $\frac{1}{8}$–$\frac{1}{4}$ in. long, cuspidate, the mucro varying from $\frac{1}{20}$ to $\frac{1}{6}$ in. long, pubescent; rhachilla stout, angular, with large pits. Glumes $\frac{1}{6}$ by $\frac{1}{10}$ in., erect or slightly recurved, broadly ovate, subacute, concave, shortly mucronate, chartaceous; the back with a green keel but with no conspicuous nerves. Stamens 2–3. Nut $\frac{1}{16}$ in. long, obovoid or suborbicular, narrowly margined all round, compressed, umbonate, with a long stipe, pale straw-colored, not ribbed, obscurely reticulate, smooth; style $\frac{1}{10}$ in. long, flattened, slightly dilated at the base, the margins of the upper part villous; stigmas 2, short. Fl. B. I. v. 6, p. 638; Dalz. & Gibs. p. 287; Boeck. in Linnæa, v. 37 (1871) p. 16; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1151.—Flowers: Sept.–Dec.

Deccan: Poona, *Cooke*!, *Woodrow*! Sind: *Pinwill*!—Distrib. Throughout India; Ceylon, China, Japan, Malaya, Australia, Polynesia.

8. **Fimbristylis diphylla,** *Vahl, Enum.* v. 2 (1806) p. 289. Rhizome 0 or rarely up to 1 in. long, stout; root-fibres rather stout; stolons 0; stems 6–24 in. long, tufted, slender, angled, striate, smooth. Leaves usually shorter than the stem, $\frac{1}{12}$–$\frac{1}{5}$ in. broad, linear, coriaceous, rather rigid, often serrulate towards the acute tip, striate above, obscurely 2-nerved beneath, and with scaberulous margins; sheaths glabrous or pubescent, rather short. Umbel simple or compound (or spikelets in a compact head); rays few, very unequal, up to 2 in. long; bracts filiform, long or short. Spikelets scattered or clustered, $\frac{1}{5}$–$\frac{3}{8}$ in. long, ovoid, acute, terete, the lowest 1–3 glumes empty, smaller than the others, deciduous (rarely elongate and bract-like); rhachilla stout, pitted. Glumes $\frac{1}{8}$ by $\frac{1}{10}$ in., broadly ovate, acute, apiculate, concave, chartaceous, loosely imbricate; keel obtuse, green, 3-nerved, the midrib reaching the tip; sides chestnut-brown. Stamens 1–3; anthers long with a conical tip. Nut $\frac{1}{20}$ in. long, broadly or orbicularly ovoid, compressed, biconvex, shortly stipitate, many-ribbed, trabeculate, umbonate, pale straw-colored or nearly white; style $\frac{1}{16}$ in. long, very broad, villous throughout, base dilated, truncate; stigmas 2, short. Fl. B. I. v. 6, p. 636; Trim. Fl. Ceyl. v. 5, p. 53; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1151. *Fimbristylis polymorpha,* Boeck. in Linnæa, v. 37 (1871) p. 14.—Flowers: Aug.

Konkan: *Stocks*!, *Woodrow*. Kanara: *Talbot*, 601, ex *C. B. Clarke*, in Journ. Linn. Soc. v. 34, p. 58. Sind: *Pinwill*!—Distrib. Throughout India; Ceylon, most warm regions.

9. **Fimbristylis spathacea,** *Roth, Nov. Pl. Sp.* (1821) p. 24. Rhizome short or elongate, stout, woody; root-fibres both stout and slender; stems densely leafy below, $\frac{1}{2}$–$1\frac{1}{2}$ ft. long, stout, obtusely trigonous, striate. Leaves many, densely crowded on the rootstock, much shorter than the stem, spreading and recurved, narrowly linear, obtuse or acute, up to $\frac{1}{16}$ in. broad, rigidly coriaceous, with recurved scaberulous margins; sheaths short, open, coriaceous. Umbel simple or compound, open or with the spikelets more or less crowded, sometimes into a globose head, but almost always pedicellate; bracts short, rigid, erect, leaf-like, with broadly dilated base which often has membranous margins. Spikelets $\frac{1}{5}$–$\frac{1}{3}$ by $\frac{1}{10}$ in., ellipsoid or ovoid, pale brown,

subterete; rhachilla stout, deeply pitted. Glumes rather laxly imbricate, $\frac{1}{10}$ in. long, broadly ovate, concave, obtuse, altogether hyaline except a narrow reddish-brown band at the back, obscurely 3–5-nerved, the keel conspicuous. Stamens usually 2. Nut about $\frac{1}{30}$ in. long, very shortly stipitate, turbinate, compressed, biconvex, rounded at the apex, tapering at the base, at first yellow, afterwards black, microscopically rugose; style about $\frac{1}{30}$ in. long, glabrous; stigmas 2, longer than the style. Fl. B. I. v. 6, p. 640; Trim. Fl. Ceyl. v. 5, p. 54; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1151. *Fimbristylis glomerata*, Nees, in Linnæa, v. 9 (1835) p. 290; Boeck. in Linnæa, v. 37 (1871) p. 47. *F. Wightiana*, Nees, in Wight, Contrib. (1834) p. 99.—Flowers: Dec.

SIND: *Pinwill*!; Karachi, *Woodrow*.—DISTRIB. India (Orissa, W. Peninsula); Ceylon, Æthiopia, Arabia, China, Malaya.

10. **Fimbristylis quinquangularis,** *Kunth, Enum.* v. 2 (1837) p. 229. Annual, glabrous, leafy; root-fibres slender; stems tufted, 6–24 in. long, slender, weak, obtusely angled, deeply striate. Leaves longer or shorter than the stem, very slender, $\frac{1}{10}$ in. broad, linear, finely acuminate, flaccid, with scaberulous margins and keel; sheaths long, subdistichous, green, coriaceous. Umbel decompound, with many suberect filiform much-branched rays bearing innumerable small pedicellate spikelets (the whole inflorescence appearing like one oblong panicle); bracts filiform, acute, usually shorter than the umbel. Spikelets $\frac{1}{8}$ by $\frac{1}{16}$ in., ellipsoid or ovoid, terete, pale brown, 6–14-flowered; rhachilla winged. Glumes rather laxly imbricate, $\frac{1}{10}$ in. long, broadly ovate, acute, mucronate by the excurrent keel; back 3-nerved; sides hyaline. Stamens 3; anthers obtuse. Nut shortly stipitate, $\frac{1}{40}$ in. long, obovoid, obtusely trigonous, yellow or pale-brown, tuberculate, transversely lineolate, slightly umbonate; style as long as the nut, more or less pubescent, the base not or scarcely dilated; stigmas 3, recurved, longer than the style. Fl. B. I. v. 6, p. 644; Dalz. & Gibs. p. 287; Boeck. in Linnæa, v. 37 (1871) p. 42; Trim. Fl. Ceyl. v. 5, p. 55; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1152.—Flowers: Sept.

KONKAN: *Law*! GUJARAT: Baroda, *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, Malaya, China, Australia.

11. **Fimbristylis miliacea,** *Vahl, Enum.* v. 2 (1806) p. 287. A glabrous leafy annual; root-fibres slender; stems 6–24 in. long, slender, obtusely angled below, triquetrous above. Leaves shorter than the stem, slender, $\frac{1}{10}$ in. broad or less, tapering to a firm point and with nearly smooth margins; sheaths subdistichous, striate with scarious margins. Umbel decompound; rays unequal, suberect or spreading, filiform, bearing many scattered very small pedicellate spikelets; bracts filiform, shorter than the umbels. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, subglobose or subcylindric, obtuse, brown; rhachilla stout, pitted, not winged. Glumes $\frac{1}{20}$ in. long, closely imbricate, ovate, obtuse, cymbiform, membranous, obscurely nerved; keel not excurrent into a mucro. Stamens 1–3; anthers obtuse. Nut $\frac{1}{40}$ in. long, obovoid, obtusely trigonous, minutely stipitate, tuberculate, transversely striolate, yellow; style as long as the nut, glabrous: stigmas 3, about as long as the style. Fl.

B. I. v. 6, p. 644; Dalz. & Gibs. p. 287; Boeck. in Linnæa, v. 37 (1871) p. 43; Trim. Fl. Ceyl. v. 5, p. 56; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1152. *Scirpus tetragonus*, Poir, Encyc. Méthod. v. 6 (1804) p. 767; Grah. Cat. p. 233. Closely allied to *F. quinquangularis*, but the spikelets are more obtuse, the glumes not mucronate, the rhachilla not winged, and the style glabrous.

KONKAN: *Lambert*!; Kalyan, *Woodrow*. SIND: *Pinwill* ex *C. B. Clarke*.—DISTRIB. More or less throughout India; Ceylon, most warm regions.

12. **Fimbristylis digitata,** *Boeck. in Flora*, v. 61 (1878) p. 35. A low glabrous plant; root-fibres slender; stems 2–5 in. long, cæspitose from a bulbous base, slender, subquadrangular, striate; sheaths short, striate, with obliquely truncate mouth. Leaves radical, few, about $\frac{1}{2}$ as long as the stem, bristle-like, linear, acute. Inflorescence in a terminal head, $\frac{1}{8}$–$\frac{1}{2}$ in. in diam., consisting of 3–5 umbellately arranged sessile spikelets; bracts usually 2, subequal, membranous, $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovate, acute, striate. Spikelets $\frac{1}{8}$–$\frac{1}{2}$ by $\frac{1}{12}$–$\frac{1}{8}$ in., erect, closely approximate, ovoid-oblong, subacute, straw-colored, subterete. Glumes $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate, cymbiform, the keel produced into a short mucro, all scarious except the 3–5-nerved back; rhachilla winged. Stamens 3; filaments reaching $\frac{1}{6}$ in. long; anthers large, $\frac{1}{30}$ in. long, very shortly pyramidally pointed, yellow. Nut $\frac{1}{30}$ in. long, globosely obovoid, trigonous, with rather acute angles, scarcely stipitate, not umbonate, faintly ribbed and trabeculate between the ribs, yellow; style exceptionally long, reaching $\frac{1}{10}$ in., glabrous, with a small conical base; stigmas 3, shorter than the style, exserted. Fl. B. I. v. 6, p. 648; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432. *Trichelostylis digitata*, Dalz. ex Boeck. in Flora, v. 61 (1878) p. 35.—Flowers: Oct.

KONKAN: *Dalzell*!, *Stocks*, *Law*!; Marmagão, *Talbot*, 2506! DECCAN: Lanoli, *Woodrow*. S. M. COUNTRY: Badami, *Woodrow*, 56! KANARA: *Law*!; Belekerri (N. Kanara), *Talbot*, 491!—DISTRIB. India (W. Peninsula).

13. **Fimbristylis Woodrowii,** *C. B. Clarke, in Journ. Linn. Soc.* v. 34 (1898) p. 68. A low glabrous slender herb; roots fibrous; stems $1\frac{1}{2}$–$4\frac{1}{2}$ in. long, cæspitose, 5-angled below the umbel. Leaves usually shorter than but occasionally as long as the stem, $\frac{1}{20}$–$\frac{1}{16}$ in. broad, acute, flat. Umbel subcompound, $\frac{1}{4}$–$\frac{5}{8}$-in. in diam., with 8–18 short rays; bracts 2–3, the longest leaf-like, exceeding the umbel. Spikelets varying in length, often geminate, $\frac{1}{6}$–$\frac{1}{2}$ in. long; rhachilla deeply pitted. Glumes ovate, boat-shaped, spirally arranged, closely imbricate, $\frac{1}{16}$–$\frac{1}{12}$ in. long, rusty-brown, with a green keel which is produced into a mucro. Stamen 1. Nut $\frac{1}{30}$ in. long, narrowly obovoid, trigonous, straw-colored or white, stipitate, not umbonate, faintly longitudinally ribbed and trabeculate between the ribs; style $\frac{1}{25}$ in. long with a bulbous base, glabrous; stigmas 3, about as long as the style. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431.—Flowers: Oct.

KONKAN: Malwán, *Woodrow*! DECCAN: Khandala, *Woodrow*!—DISTRIB. India (W. Peninsula).

Mr. Clarke originally described the plant from undergrown specimens from Khandala, the spikelets of which did not exceed $\frac{1}{6}$ *in. long.* Specimens collected more recently at Malwán show that the spikelets reach $\frac{1}{2}$ *in. long.*

14. **Fimbristylis monostachya,** *Hassk. Pl. Jav. Rar.* (1848) p. 61. Densely tufted and leafy; root-fibres slender. Stems 6–12 in. long, very slender or filiform, striate. Leaves crowded on the swollen base of the stem, filiform or nearly so, about ½ as long as the stem, acute or acuminate; sheaths short, with scarious margins. Spikelets solitary (rarely 2) on the stem, variable in size, ⅕–½ by ⅙–¼ in., compressed, ovate, acute, shining, pale straw-colored, the 2 lower glumes empty and longer than the others, cuspidate; rhachilla slender with persistent wings. Glumes loosely imbricate, subdistichous, much-keeled, ovate, acute, cuspidate, coriaceous. Stamens 3; anthers $\frac{1}{16}$ in. long, subacute, yellow. Nut $\frac{1}{10}$ in. long with a long stalk, globosely pyriform, narrowed into the stout stipes, trigonous with rather acute angles, tuberculate on the 3 faces, with a short pyramidal apex, straw-colored, glabrous; style ⅛ in. long, stout, pubescent all over and on the conical base; stigmas 3, much shorter than the style. Fl. B. I. v. 6, p. 649; Trim. Fl. Ceyl. v. 5, p. 59; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1150. *Abildgaardia monostachya*, Vahl, Enum. v. 2 (1806) p. 296; Dalz. & Gibs. p. 286; Boeck. in Linnæa, v. 37 (1871) p. 53.—Flowers: July.

Deccan: Poona, *Jacquemont*, 411! S. M. Country: Badami, *Woodrow*.—Distrib. Throughout the warmer parts of India; Ceylon, most warm countries.

15. **Fimbristylis monticola,** *Hochst. ex Steud. Syn. Pl. Cyp.* (1855) p. 111. A very slender plant; root-fibres filiform; stems 3–12 in. or more long, filiform, obtusely trigonous, striate, flexuous. Leaves many at the base of the stem, shorter than or sometimes nearly equalling the stem, filiform, acute, with distantly scabrid margins; sheaths short, membranous. Umbel subsimple or subcompound; rays 2–4 with 1 or 2 spikelets on each, ¼–½ in. long, filiform, spreading or recurved; bracts very short, setiform. Spikelets ¼–⅓ in. long, elliptic-oblong, obtuse or acute, compressed, dark-brown; lowest glumes very small, deciduous; rhachilla with deep pits with hyaline margins. Glumes laxly subdistichously imbricate, ⅛ in. long, triangularly ovate, apiculate, concave, coriaceous, with hyaline margins; back 3-nerved; keel conspicuous. Stamens 3; anthers with an acute tip. Nut stipitate, $\frac{1}{20}$ in. long, globosely obovoid, obtusely trigonous, minutely tuberculate, yellow or brown; style $\frac{1}{16}$ in. long, with bulbous base, more or less pubescent all over; stigmas 3, as long as the style. Fl. B. I. v. 6, p. 642; Trim. Fl. Ceyl. v. 5, p. 60; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431.—Flowers: Aug.

Konkan: Shelarvadi (Bhore Ghát), *Woodrow*, 10!—Distrib. India (W. Peninsula); Ceylon.

16. **Fimbristylis complanata,** *Link, Hort. Berol.* v. 1 (1827) p. 292. Glabrous; rhizome very short, hard, creeping; root-fibres wiry; stems 8–24 in. long, much flattened near the top, 2-edged, ⅛ in. broad, deeply grooved and ribbed, quite smooth. Leaves crowded at the base of the stem and shorter than it, 3–8 by ⅛–¼ in., coriaceous, flat, linear, suddenly narrowed at the tip, obtuse or subacute, with scaberulous margins; sheaths coriaceous with scarious margins. Umbels decompound, effuse, 1–3 in. broad, with few or many flattened rays, loosely corymbosely branched, the branches bearing small shortly pedicellate

brown spikelets; bracts ½ as long as the umbel, the largest leaf-like, erect, the others subulate. Spikelets ⅛–¼ by $\frac{1}{20}$–$\frac{1}{10}$ in., ovoid-oblong, few-flowered, brown, with more or less distichously arranged glumes, the lowest glume empty. Glumes $\frac{1}{10}$ in. long, ovate, the keel prolonged into a long mucro; sides brown, the margins not hyaline; keel deep, acute. Stamens 3; anthers long, obtuse. Nut $\frac{1}{30}$ in. long, obovoid, stipitate, obtusely trigonous, pale straw-colored or nearly white, slightly umbonate, minutely warted; style longer than the nut with a conical base, slender, glabrous; stigmas 3, long. Fl. B. I. v. 6, p. 646; Trim. Fl. Ceyl. v. 5, p. 63; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1152. *Scirpus complanatus*, Retz. Obs. fasc. 5 (1789) p. 14; Grah. Cat. p. 233.

DECCAN: near Chattersinghi (Poona districts), *Ranade*! SIND: *Pinwill*!—DISTRIB. India (Mussooree, Saharanpur, Assam, Birma, W. Peninsula); Ceylon, Indo-China, Africa, Oceania.

VAR. *microcarya*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 646 (by misprint *microcarpa*, an error which Mr. Clarke has corrected on the sheets in Herb. Kew.). Stems slender, hardly flattened under the umbel. Spikelets more slender. Nut very small, velate (*i. e.*, the outermost cells withering and peeling off). Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431. *Fimbristylis microcarya* (sp.), F. Muell. Fragm. Phyt. Austral. v. 1 (1858–59) p. 200; Benth. Fl. Austral. v. 7 (1878) p. 316.

DECCAN: water-holes at Hewra, *Dalzell*!; Poona, *Woodrow*.

17. **Fimbristylis junciformis,** *Kunth, Enum.* v. 2 (1837) p. 239. Glabrous; rhizome woody, short or creeping; root-fibres stout, wiry; stems 4–18 in. long, tufted, rigid, 4–5-angled or compressed above, deeply striate. Leaves crowded round the base of the stems and very much shorter than them, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, spreading and recurved, flat, coriaceous, with a triangular acute tip and scaberulous margins; sheaths short, coriaceous. Umbel compound, with few slender rays 1–3 in. long, bearing distant or clustered small chestnut-brown spikelets; bracts 2–4, much shorter than the umbel, erect, rigid, acute. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ by $\frac{1}{10}$ in., the 2 lowest glumes distichous, the lowest empty; rhachilla stout, with caducous wings. Glumes $\frac{1}{10}$ in. long, ovate, shortly mucronate, with slender keel and pale hyaline margins. Stamens 3; anthers long, acuminate. Nut $\frac{1}{20}$ in. long, very shortly stipitate, obovoid, trigonous, obscurely ribbed and with faint vein-like markings, pale straw-colored or nearly white, minutely umbonate; style $\frac{1}{12}$ in. long with conical base, pubescent above; stigmas 3, about as long as the style. Fl. B. I. v. 6, p. 647; Boeck. in Linnæa, v. 37 (1871) p. 49; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1152.—Flowers: Nov.

DECCAN: Karli, *Woodrow*. SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, Madagascar, Philippines.

5. STENOPHYLLUS, Rafin.

Annual herbs; stems slender, leafy at the base only. Leaves very narrow, filiform or capillary. Spikelets small, crowded in a terminal head or umbellate; bracts short. Glumes few or many, imbricate all

round the rhachilla, 1–2 lowest and often the uppermost empty; hypogynous bristles 0. Stamens 1–3; anthers linear, obtuse or apiculate. Ovary obovoid; style slender, glabrous; stigmas 3. Fruit an obovoid obtuse trigonous smooth nut, crowned by the persistent style-base.—DISTRIB. Species about 70, in most warm regions.

The name *Stenophyllus* [Raf. Neog. (1825) p. 4] is prior to the name *Bulbostylis*, Kunth (1837), as pointed out by Dr. N. L. Britton in "The Sedges of Jamaica," published in the 'Bulletin of the Jamaica Department of Agriculture,' v. 5, Suppl. 1, p. 1.

1. **Stenophyllus barbata** (*Scirpus*), *Rottb. Descrip. et Icon.* (1773) p. 52. . A slender annual 3–12 in. high; stems tufted, filiform, glabrous, striate. Leaves about $\frac{1}{2}$ as long as the stem, capillary, acuminate, the margins involute, scaberulous upwards; sheaths short, membranous, with bearded mouths. Spikelets $\frac{1}{8}$–$\frac{1}{4}$ in. long, few-flowered, oblong-lanceolate, reddish-brown, crowded in a terminal head $\frac{1}{4}$–$\frac{1}{2}$ in. in diam.; bracts shorter than or rarely exceeding the spikelets; rhachilla stout. Glumes $\frac{1}{10}$ in. long, ovate, laterally compressed, boat-shaped, loosely imbricate, acute or with the stout acute keel ending in a mucro. Stamen 1; anther linear, subacute. Nut $\frac{1}{30}$ in. long, globosely obovoid, trigonous with prominent angles, crowned with the minute base of the style, smooth, pale straw-colored; style slender; stigmas 3. *Bulbostylis barbata*, Kunth, Enum. v. 2 (1837) p. 208; C. B. Clarke, in Hook. f. Fl. B. I. v. 6, p. 651; Trim. Fl. Ceyl. v. 5, p. 66; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1156. *Scirpus barbatus*, Rottb. Descrip. et Icon. (1773) p. 52, t. 17, fig. 4; Boeck. in Linnæa, v. 36 (1870) p. 751.—Flowers: July.

S. M. COUNTRY: Badami, *Woodrow*. SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, warm regions.

6. ELEOCHARIS, R. Br.

Glabrous herbs; stems tufted, simple, erect, embraced by one or more membranous truncate sheaths. Leaves obsolete, or, rarely, a herbaceous or membranous limb on the sheath. Inflorescence a single solitary ovoid or cylindric many-flowered spikelet. Glumes imbricate round the rhachilla, membranous or coriaceous, the lowest usually empty, bract-like, but not longer than the spikelet; the uppermost empty, the remainder 2-sexual; hypogynous bristles 8 or fewer, rarely absent, retrorsely scabrous or spinulose. Stamens 3–1; anthers linear or linear-oblong, crested, muticous, or with an acicular tip. Ovary orbicular-ovoid; style with a swollen base; stigmas 2–3, filiform or flattened. Fruit a plano-convex or trigonous nut, crowned by the persistent and swollen, pyriform conical or depressed style-base.—DISTRIB. Cosmopolitan; species 113.

Glumes subrigid, smooth or striate, but keeled, concolorous; stems usually stout; stigmas 2–3.	
Nut smooth; stems terete, transversely septate when dry.	1. *E. plantaginea*.
Nut longitudinally striate; stems subtriquetrous below the spikelet, not septate.	
Spikelets acute; glumes ovate, subacute	2. *E. fistulosa*.
Spikelets obtuse; glumes quadrate, rounded or subtruncate	3. *E. spiralis*.

Glumes membranous, usually 1-3-nerved, with a green keel
stems usually slender.
Stigmas 2; nut compressed.
Roots fibrous; rhizome short or 0.
Bristles glistening, white ..... 4. *E. atropurpurea.*
Bristles brown or rusty ..... 5. *E. capitata.*
Rhizome creeping; bristles rusty-brown..... 6. *E. palustris.*
Stigmas 3; nut obovoid, trigonous ..... 7. *E. Chætaria.*

1. **Eleocharis plantaginea,** *R. Br. Prod.* (1810) p. 224 (*in note*). Stolons long, $\frac{1}{8}$–$\frac{1}{6}$ in. in diam.; stems 1–3 ft. high, $\frac{1}{8}$–$\frac{1}{3}$ in. in diam., densely tufted, appearing transversely septate when dry; sheaths 2–8 in. long, very thin, soon torn, bright red-brown, shining. Spikelets $\frac{3}{4}$–$1\frac{3}{4}$ in. long, straw-colored, rather narrower than the stem; rhachilla stout, angled, with irregular broad concave facets between the insertion of the glumes. Glumes closely imbricate, $\frac{1}{5}$ in. long, subrigid, concolorous, not keeled, broadly ovate, obtuse, rarely truncate, 1-nerved, coriaceous, persistent, the lowest very stout, appearing as a continuation of the stem. Bristles 7, equalling or exceeding the nut, retrorsely scabrid, yellow. Stamens 3; anthers narrowly linear, with a long setaceous tip. Nut $\frac{1}{12}$ in. long, orbicular-obovoid, compressed, smooth, yellowish; style long, flattened, with a triangular base; stigmas 3. Fl. B. I. v. 6, p. 625; Trim. Fl. Ceyl. v. 5, p. 68; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1148. *Scirpus plantaginus,* Roxb. Fl. Ind. v. 1 (1832) p. 212; Grah. Cat. p. 233. *Scirpus plantaginoides,* Rottb. Descrip. et Icon. (1773) p. 45, t. 15, fig. 2. *Heleocharis plantaginea,* Boeck. in Linnæa, v. 36 (1870) p. 474.—Flowers: Sept.

Konkan: Bombay without locality or authority in Herb. Kew.! Gujarat: Baroda, *Woodrow.* Sind: *Pinwill!*—Distrib. India (N.-West, Assam, W. Peninsula); Ceylon, Malay Peninsula, Tropics of the Old World.

2. **Eleocharis fistulosa,** *Link, in Spreng. Jahrb. Gewäch.* (1820) Heft 3, p. 78. Stems robust or slender, 1–3 ft. by $\frac{1}{8}$–$\frac{1}{4}$ in., stoloniferous, triquetrous under the spikelet, concave on one face, not transversely septate; sheaths obliquely truncate, thinly membranous, loose, ending in an ovate, acute or lanceolate hyaline limb. Spikelets $\frac{3}{4}$–$1\frac{1}{2}$ in. long, as broad as the stem or broader, greenish; lowest glumes bractiform, broadly ovate, coriaceous, with narrow membranous margins; rhachilla slender, angular, with broad concave facets between the glumes. Fertile glumes nearly $\frac{1}{5}$ in. long, ovate-oblong or subobovate, multistriate on the back outside, often with minute brown spots inside; bristles longer than the nut, brown, retrorsely scabrid. Nut $\frac{1}{10}$ in. long, obovoid, striate, pale, tipped with the annular somewhat saucer-shaped style-base, which is about three-fourths the width of the nut; stigmas usually 3. Fl. B. I. v. 6, p. 626; Trim. Fl. Ceyl. v. 5, p. 70; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1148. *Heleocharis fistulosa,* Boeck. in Linnæa, v. 36 (1870) p. 472.

Kanara: *Talbot,* 1040, ex *C. B. Clarke,* in Journ. Linn. Soc. v. 34 (1898–1900) p. 48.

I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew.—Distrib. India (Nipal, Assam, Birma, W. Peninsula); Tropics generally.

3. **Eleocharis spiralis,** *R. Br. Prodr.* (1810) p. 224 (*in note*). Stems densely tufted, stoloniferous, 1–2 ft. by $\frac{1}{8}$–$\frac{1}{6}$ in., trigonous or

biconvex below, triquetrous above; upper sheath with a broad ovate-oblong appressed limb sometimes reaching $\frac{1}{4}$ in. long. Spikelets $\frac{1}{2}$–1 in. long, thicker than the stem, cylindric, obtuse, pale; lowest glume like the others but more coriaceous; rhachilla stout, terete, deeply regularly pitted. Glumes very many, closely spirally imbricate, $\frac{1}{8}$ in. long and as broad as long, quadrate, rounded at the apex, with a hyaline border on the sides and on the top; back thick, pale (nearly white) outside, dotted with brown spots inside; bristles much shorter than the nut, scabrid. Stamens $\frac{1}{8}$ in. long; anthers narrow. Nut $\frac{1}{16}$ in. long (not including the conical whitish style-base, which reaches to about $\frac{1}{30}$ in. long and which is as broad as $\frac{2}{3}$ of the nut), ashy brown, globosely obovoid, biconvex, shining, with thickened margins, faintly striate and with minute transverse yellowish streaks; style with the style-base as long as the nut; stigmas 2 or 3. Fl. B. I. v. 6, p. 627; Trim. Fl. Ceyl. v. 5, p. 70; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1148. *Scirpus spiralis*, Rottb. Descrip. et Icon. (1773) p. 45, t. 15, fig. 1.—Flowers: Dec.

Konkan: Salsette, *Jacquemont*, 725!; Goa, *Lisboa*, 45!—Distrib. India (Bengal, Birma, W. Peninsula); Ceylon.

4. **Eleocharis atropurpurea,** *Kunth, Enum.* v. 2 (1837) p. 151. Annual; roots fibrous; stems slender, densely tufted, 2–7 in. long, straight or curved. Leaves 0; sheaths short. Spikelets $\frac{1}{8}$–$\frac{1}{4}$ in. long, ovoid, obtuse or subacute, much broader than the stem, many-flowered; rhachilla pitted. Glumes $\frac{1}{16}$–$\frac{1}{12}$ in. long, broadly ovate-oblong, obtuse, concave, loosely imbricate, easily detached; back green; sides membranous with a chestnut-brown band along each; bristles 4–7, slender, scabrid, as long as the nut, white. Anthers small, apiculate. Nut $\frac{1}{12}$ in. long, obovoid, biconvex, smooth, black, apiculate with the short stout white style-base; stigmas 2. Fl. B. I. v. 6, p. 627; Trim. Fl. Ceyl. v. 5, p. 71; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1148. *Heleocharis atropurpurea*, Boeck. in Linn. v. 36 (1870) p. 458.—Flowers: Sept.

Gujarat: Godra, *Woodrow*! Sind: *Pinwill*!—Distrib. India (W. Himalaya, Assam, W. Peninsula); Ceylon, Tropics generally.

5. **Eleocharis capitata,** *R. Br. Prod.* (1810) p. 225. Annual; root fibrous; stems densely tufted, numerous, 2–10 in. long, slender, trigonous. Leaves 0; sheaths short, sometimes tinged with purple, the mouth oblique, acute. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. in diam., globosely ovoid, rounded at the apex, pale. Lowest glumes bractiform, $\frac{1}{20}$ in. long, ovate-oblong, obtuse; fertile glumes $\frac{1}{16}$ in. long, orbicular-ovate, obtuse, imbricate, easily detached, concave; rhachilla terete, pitted; bristles longer than the nut, 7 or fewer, pale rose-brown when ripe (*Clarke*), retrorsely scabrid. Anthers small, linear, obtuse. Nut $\frac{1}{30}$ in. long, globosely obovoid, brown, smooth, shining, apiculate with the broad style-base; style short; stigmas 2. Fl. B. I. v. 6, p. 627; Dalz. & Gibs. p. 285; Trim. Fl. Ceyl. v. 5, p. 72; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1148. *Heleocharis capitata*, Boeck. in Linnæa, v. 36 (1870) p. 461.—Flowers: Sept.

Deccan: Poona, *Woodrow*. Kanara: *Thomson*. Sind: *Dalzell*!; Jemadar ka Landa near Karachi, *Stocks*!—Distrib. India (Behar, Bengal, W. Peninsula); Ceylon, Singapore, most warm countries.

6. **Eleocharis palustris,** *R. Br. Prod.* (1810) p. 224 (*in note*). A variable plant; rhizome creeping, black or chestnut-brown, rooting from the nodes; stems 4–24 by $\frac{1}{25}$–$\frac{1}{8}$ in.; upper sheath truncate or sometimes produced at one side into a small triangular limb. Spikelets $\frac{1}{4}$–1 by $\frac{1}{8}$–$\frac{1}{5}$ in., ellipsoid or cylindric, chestnut-brown or straw-colored, subacute, the lowest glume bract-like, empty, suborbicular, smaller than the fertile ones, coriaceous, with hyaline margins, about $\frac{1}{2}$-surrounding the stem; bristles usually 4, longer than the nut, scabrid, brown. Fertile glumes $\frac{1}{8}$–$\frac{1}{5}$ in. long, thinly membranous, either hyaline except the back which is narrow and green, ovate-lanceolate, obtuse or subacute; or elliptic, acute, with the back and sides chestnut-brown and with hyaline margins. Stamens 3. Nut $\frac{1}{12}$ in. long (not including the large oblong-conic obtuse subcompressed pale or brown-dotted style-base which reaches sometimes $\frac{1}{16}$ in. long), globosely obovoid, smooth, biconvex, bright yellow or pale brown, the margins scarcely thickened; style above the conical base $\frac{1}{20}$ in. long; stigmas 2 (very rarely 3), about as long as the style. Fl. B. I. v. 6, p. 628; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. 1148. *Heleocharis palustris,* Lindl. Syn. Brit. Fl. (1829) p. 280; Boeck. in Linnæa, v. 36 (1870) p. 466.

SIND: Hyderabad, *Woodrow.*—DISTRIB. Cosmopolitan except Australia.

7. **Eleocharis Chætaria,** *Rœm. & Schult. Syst.* v. 2 (1817) p. 154. Glabrous; roots fibrous, rarely with a white filiform rhizome 1 in. long; stems 1–8 in. long, densely tufted, filiform or capillary, straight or curved; sheaths short, membranous. Spikelets $\frac{1}{8}$–$\frac{1}{5}$ in. long, ovoid, obtuse, usually tinged with red, terete or compressed, with 1–4 nuts, the lowest glume boat-shaped, empty, $\frac{1}{8}$ in. long, with green obscurely 3-nerved back and broad hyaline margins; rhachilla narrowly winged; bristles 6 or fewer, rather longer than the nut, pale-brown, scabrid, sometimes wanting. Glumes 6–8, subdistichous, loosely imbricate, reaching $\frac{1}{8}$ in. long, boat-shaped, with narrow green backs and chestnut-brown sides and with hyaline margins. Anthers linear, $\frac{1}{10}$ in. long. Nut obovoid, trigonous, $\frac{1}{20}$ in. long (not including the acutely pyramidal style-base, which is less than $\frac{1}{50}$ in. long and nearly as broad as the nut), cancellate, the angles smooth produced into short prominences or shoulders below the convex top, dull pale-straw-colored; style short; stigmas 3, very long. Fl. B. I. v. 6, p. 629; Trim. Fl. Ceyl. v. 5, p. 71; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 431; Prain, Beng. Pl. p. 1148. *Heleocharis Chætaria,* Boeck. in Linnæa, v. 36 (1870) p. 428.

S. M. COUNTRY: Londa, *Woodrow*; Dharwar, *Woodrow.*—DISTRIB. More or less throughout India; Ceylon, Malacca, Tropics generally.

7. SCIRPUS, Linn.

Glabrous often tall herbs, leafless or leafy at the base only (very rarely leafy all along the stem); stems terete, trigonous or triquetrous. Inflorescence terminal or lateral, of clusters or umbels of oblong or ovoid many-flowered sessile or pedicellate spikelets. Glumes spirally imbricating round a stout or slender rhachilla, the lowest 2 and a few of the uppermost empty; hypogynous bristles 0 or 2–7, retrorsely

scabrid or rarely (*S. litoralis* and *S. Kysoor*) plumose. Stamens 1–3; anthers linear. Ovary obovoid; style slender, the base dilated; stigmas 2–3, slender. Nut obovoid, trigonous or biconvex, smooth or nearly so; the style leaving no button on the nut.—DISTRIB. Species about 136, spread throughout the world.

Large or middle-sized herbs; stems 1–6 ft. or more long, leafy only near the base, rush-like; hypogynous bristles present or not.
- Nut marked with transverse wavy lines; hypogynous bristles 0.
  - Stems flowering nearer to the base than the top, stout, terete, spongy; glumes $\frac{1}{5}$ in. long, with a subcordate base, not inflated in front, hardly keeled ..... 1. *S. articulatus.*
  - Stems flowering nearer to the top than the base, slender, obtusely trigonous; glumes $\frac{1}{10}$ in. long, with tapering (not subcordate) base, not inflated in front, strongly keeled ..... 2. *S. supinus.*
  - Stems flowering nearer to the top than the base, slender, subcompressed; glumes often 5-ranked, $\frac{1}{4}$ in. long, with tapering (not subcordate) base, inflated in front, keeled ..... 3. *S. quinquefarius.*
- Nut not marked with transverse wavy lines.
  - Hypogynous bristles 0 ..... 4. *S. corymbosus.*
  - Hypogynous bristles present.
    - Hypogynous bristles retrorsely scabrid (not plumose).
      - Glumes 2-fid at the apex ..... 5. *S. maritimus.*
      - Glumes not 2-fid at the apex ..... 6. *S. grossus.*
    - Hypogynous bristles plumose.
      - Inflorescence lateral; nut plano-convex ..... 7. *S. litoralis.*
      - Inflorescence terminal; nut obovoid ..... 8. *S. Kysoor.*

Small tufted herbs with slender stems never reaching 1 ft. long; hypogynous bristles 0.
- Perennial herb ..... 9. *S. Kyllingioides.*
- Annual herbs.
  - Glumes elliptic; mucro $\frac{1}{4}$ the length of the blade; bracts many, reaching $3\frac{1}{2}$ in. long ..... 10. *S. Michelianus.*
  - Glumes trapeziform; cusp as long as the blade; bracts 1–3, reaching 1 in. long ..... 11. *S. squarrosus.*

1. **Scirpus articulatus,** *Linn. Sp. Pl.* (1753) p. 47. A glabrous perennial (?) herb; stems 1–3 ft. long, densely tufted, as thick as the little finger, spongy and transversely septate within (visible externally), terete, striate, flowering nearer the base than the top. Leaves 0, or the sheaths with a membranous acute tip sometimes 1 in. long. Spikelets variable in length, $\frac{1}{4}$–$\frac{3}{4}$ in. long, ovoid-oblong, acute, terete or obscurely angular, rusty-brown, sessile in laterally stellately spreading clusters of 15–60; bracts 0. Glumes $\frac{1}{5}$ in. long and nearly as broad, broadly ovate, acute, very shortly mucronate, closely imbricate, membranous, concave, persistent, scarcely keeled, with a subcordate base and hyaline margins. Stamens 3, reaching $\frac{1}{5}$ in. long; anthers linear, obtuse, $\frac{1}{30}$ in. long, yellow. Nut $\frac{1}{12}$ in. long, obovoid, sharply triquetrous, black, opaque, shortly pointed, striate with transverse wavy lines; style $\frac{1}{12}$ in. long; stigmas 3, nearly as long as the style. Fl. B. I. v. 6, p. 656; Grah. Cat. p. 233; Boeck. in Linnæa, v. 36 (1870) p. 702; Trim. Fl. Ceyl. v. 5, p. 75; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain,

Beng. Pl. p. 1159. *Isolepis articulata*, Nees, in Wight, Contrib. (1834) p. 108; Dalz. & Gibs. p. 286.—Flowers: Oct.-Feb.

KONKAN: *Woodrow*. GUJARAT: Dakor, *Kanitkar*! SIND: *Pinwill*!—DISTRIB. Throughout India; Ceylon, Africa, Philippines, Australia.

2. **Scirpus supinus,** *Linn. Sp. Pl.* (1753) p. 49. A glabrous annual; roots fibrous; stems densely tufted, 6–15 in. long, slender, obtusely trigonous, striate, flowering above the middle. Leaves very short or 0; sheaths short or long, the mouth oblique, rarely produced into a very short erect acute limb. Spikelets 3–8 in a cluster, coming off from 2 to 6 in. below the top of the stem, $\frac{1}{6}$–$\frac{1}{4}$ in. long, ellipsoid or oblong, green, sessile or nearly so, obscurely angular by reason of the sharp keels of the glumes; rhachilla slender, not winged. Glumes $\frac{1}{10}$ in. long, ovate, acute, membranous, closely imbricate, strongly keeled, the keel produced into a short mucro; hypogynous bristles 0. Nut $\frac{1}{16}$ in. long, globosely obovoid, rugose with transverse wavy lines, trigonous, umbonate, black; style $\frac{1}{30}$ in. long; stigmas 3, nearly as long as the style. Fl. B. I. v. 6, p. 655; Boeck. in Linnæa, v. 36 (1870) p. 699; Trim. Fl. Ceyl. v. 5, p. 74; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1159.—Flowers: Oct.-Feb.

KONKAN: *Law*!; Kalyan, *Woodrow*; Bansda, *Woodrow*. GUJARAT.: Dakor, *Kanitkar*! SIND: *Pinwill*!—DISTRIB. More or less throughout India; Ceylon, Old World generally and in America.

VAR. *uninodis*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 656. Inflorescence of 1–4 heads in a contracted umbel, the rays rarely reaching 1 in. long. Prain, Beng. Pl. p. 1159. *Isolepis uninodis* (sp.), Delile, Fl. Egypte, p. 8, t. 6, fig. 1. *Scirpus mucronatus*, Roxb. Fl. Ind. v. 1 (1832) p. 216 (*not* of Linn.).

SIND: *Pinwill*!

3. **Scirpus quinquefarius,** *Ham. in Wall. Cat.* (1828) 3465. Root fibrous; stems 3–25 in. long, slender, terete or slightly compressed, often when dry transversely septate; sheaths with an obliquely truncate mouth. Leaves almost 0. Spikelets 1–9 in a single lateral dense head, usually nearer to the top than the base of the stem, $\frac{3}{8}$–$\frac{1}{2}$ by $\frac{1}{4}$ in., ovoid-oblong, obtuse, slightly compressed, pale-brown, shining. Glumes inflated in fruit, $\frac{1}{6}$ in. long, usually 5-ranked, elliptic-lanceolate, membranous, multistriate, acutely mucronate, the apex slightly recurved, keeled, tapering (not cordate) at the base; hypogynous bristles 0. Stamens 3, reaching $\frac{1}{8}$ in. long; anthers linear, obtuse. Nut $\frac{1}{16}$ in. long, obovoid, acutely trigonous, apiculate, rugose with transverse wavy lines, black; style $\frac{1}{16}$ in. long; stigmas 3, shorter than the style. Fl. B. I. v. 6, p. 657; Boeck. in Linnæa, v. 36 (1870) p. 701; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1159.—Flowers: Nov.-Dec.

KONKAN: *Dalzell*!; Bombay, without authority in Herb. Kew.! GUJARAT: Umrat, *Woodrow*. SIND: *Pinwill*!; Bhubak, *Woodrow*.—DISTRIB. India (North-West, Central India, W. Bengal, W. Peninsula); Afghanistan, Beluchistan, Africa.

4. **Scirpus corymbosus,** *Heyne, ex Roth, Nov. Pl. Sp.* (1821) p. 28. Glabrous; rhizome 2–4 in. long, horizontal; stems approximate, reaching 3 ft. long, stout, terete, finely striate; sheaths few, near the base, with

an obliquely subacute mouth. Leaves 0. Inflorescence lateral, from near the top of the stem, which is produced bract-like above it into an acute stiff point. Spikelets in pedunculate clusters ¼–⅜ in. long, ellipsoid, reddish-brown. Glumes ⅛ in. long, broadly ovate, acute, pale-brown with darker streaks, strongly keeled, the keel produced into a short erect mucro; hypogynous bristles 0. Stamens 3, reaching ⅛ in. long; anthers $\frac{1}{30}$ in. long, linear, obtuse, yellow. Nut $\frac{1}{12}$ in. long, obovoid, trigonous, with a somewhat pyramidal apex, smooth, not rugose with transverse wavy lines, yellow; style reddish, $\frac{1}{10}$ in. long; stigmas as long as the style. Fl. B. I. v. 6, p. 657; Boeck. in Linnæa, v. 36 (1870) p. 706; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432.—Flowers: Dec.

KONKAN: Goa, *Woodrow*. SIND: *Pinwill*!, *Woodrow*.—DISTRIB. India (Bandelkand, W. Peninsula); Africa, Madagascar.

5. **Scirpus maritimus,** *Linn. Sp. Pl.* (1753) p. 51. Glabrous; rhizome creeping, bearing tubers; stems 1–3 ft. long, stout, triquetrous. Leaves grass-like, harsh, numerous, often as long as the stem, ¼–⅓ in. broad, keeled; sheaths long. Inflorescence terminal or subterminal, umbellate with rays of unequal length; bracts 3–5, leaf-like, the longest much exceeding the inflorescence, keeled, finely pointed. Spikelets 3–8 or solitary on each ray (or umbel rarely reduced to a head of 3–1 spikelets), ⅜–1 in. long and often ⅕ in. in diam., ovate-oblong or cylindric, reddish-brown. Glumes ¼ in. long, broadly ovate, strongly keeled, membranous, glabrous or puberulous, brown or golden-brown, bifid at the apex and with a long subrecurved mucro about $\frac{1}{20}$ in. long formed by the production of the keel between the apical lobes; hypogynous bristles 3–6, unequal, $\frac{1}{16}$–$\frac{1}{10}$ in. long, shorter than the nut, slender, retrorsely scabrid. Stamens 3, reaching ¼ in. long. Nut ⅛ in. long, obovoid, obtusely trigonous, umbonate, quite smooth, pale yellow, nearly white; style $\frac{1}{10}$–⅛ in. long; stigmas 3, as long as the style. Fl. B. I. v. 6, p. 658; Dalz. & Gibs. p. 288; Boeck. in Linnæa, v. 36 (1870) p. 722; Watt, Dict. Econ. Prod. v. 6, part 2, p. 491. *Scirpus tridentatus*, Roxb. Hort. Beng. (1814) p. 81; Fl. Ind. v. 1 (1832) p. 225; Grah. Cat. p. 233.—Flowers: Nov.

KONKAN: Bombay, *Woodrow*. DECCAN: Miraj, *Woodrow*. GUJARAT: Umrat, *Woodrow*! SIND: *Dalzell*!, *Stocks*, 1094!; Karachi, *Woodrow*.—DISTRIB. India (Kashmir, Kashgar, Moradabad, W. Peninsula); Old World with vars. in Australia and America.

VAR. *affinis*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 659. Spikelets capitate, usually 3–1, large, ovoid-lanceolate; glumes straw-colored, sparingly hairy; hypogynous bristles 4, as long as the nut; nut small; stigmas 2. Prain, Beng. Pl. p. 1159. *Scirpus affinis* (sp.), Roth, Nov. Pl. Sp. (1821) p. 30; Nees, in Wight, Contrib. (1834) p. 111.

KONKAN: Bombay, *Law*! DECCAN: Nasik, *Cooke*! SIND: *Dalzell*!

6. **Scirpus grossus,** *Linn. f. Suppl.* (1781) p. 104. Rootstock stout, stoloniferous or not; root-fibres thick; stem 6–10 ft. high, as thick as the little finger, triquetrous, spongy, with concave sides and smooth angles. Leaves few, radical, 2–3 ft. by ½ in., much keeled,

finely acuminate, coriaceous, with smooth or scaberulous margins; sheaths long, open. Spikelets subglobosely ovoid, $\frac{1}{6}$–$\frac{3}{8}$ in. long, dark-brown, in large corymbiform decompound terminal open or contracted umbels 3–8 in. in diam., solitary on the top of rigid erect or spreading rays of various lengths; involucral bracts 3, leaf-like, the longest up to 3 ft. long by $\frac{1}{2}$–$\frac{3}{4}$ in. broad at the base, flat, linear, acuminate; bracts of the secondary and tertiary umbels lanceolate, acute, scarious, $\frac{1}{4}$–$\frac{1}{2}$ in. long. Glumes rather loosely imbricate, $\frac{1}{8}$–$\frac{1}{6}$ in. long, elliptic, obtuse, mucronate, keeled, membranous; hypogynous bristles 6, unequal, longer than the nut, retrorsely scabrid (not plumose), brown. Stamens 3, reaching $\frac{1}{6}$ in. long; anthers linear, large. Nut $\frac{1}{12}$ in. long, obovoid, trigonous, with a minute conical tip (*style-base*), ashy-grey or yellowish, smooth; style $\frac{1}{16}$ in. long, with dilated base; stigmas 3, as long as the style. Fl. B. I. v. 6, p. 659; Boeck. in Linnæa, v. 36 (1870) p. 723; Trim. Fl. Ceyl. v. 5, p. 77; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1159.—Flowers: Sept.

KONKAN: Kalyan, *Woodrow*. DECCAN: Poona, *Cooke*! SIND: *Pinwill*!—DISTRIB. More or less throughout India; Ceylon, Malaya, Tonkin, Philippines.

7. **Scirpus litoralis,** *Schrad. Fl. Germ.* v. 1 (1806) p. 142, t. 5, fig. 7. Rootstock stout, hard, with matted fibrillose root-fibres; stem 2–3½ ft. long, as thick as the thumb at the soft base, and as a crow-quill near the top, terete below, trigonous above, spongy, striate, smooth. Leaves 6–24 by $\frac{1}{10}$–$\frac{1}{4}$ in., membranous, grass-like, finely acuminate; sheaths long, soft, open. Inflorescence near the top of the stem, which is produced 1–6 in. beyond the umbel. Spikelets pale brown, $\frac{1}{4}$–$\frac{1}{2}$ in. long, oblong, obtuse, terete, pedicellate, in lax subcorymbose or paniculate umbels with drooping rays 1–2 in. long. Glumes $\frac{1}{6}$ in. long, membranous, ovate-oblong, obtuse, notched at the top, mucronate in the notch by the excurrent slender green keel; hypogynous bristles 2–7, longer than the nut, unequal, linear, plumose with moniliform hairs. Stamens 2 or 3, reaching $\frac{1}{6}$ in. long; filaments broad; anthers slender, tipped with a red appendage. Nut $\frac{1}{16}$ in. long and broad, orbicularly obovoid, plano-convex, smooth, with a long apiculation, dull-brown; style $\frac{1}{16}$ in. long; stigmas 2, as long as the style. Fl. B. I. v. 6, p. 659; Trim. Fl. Ceyl. v. 5, p. 77; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1159. *Scirpus subulatus*, Dalz. & Gibs. Bo. Fl. (1861) p. 288 (*not* of Vahl).

SIND: *Dalzell*! GUJARAT: Ahmedabad, *Burkhill* ex *Drummond*; Kathiawar, *Mehta* ex *Drummond*; Rajkote, *Cooke*!—DISTRIB. India (Panjáb, Central India, W. Peninsula); Ceylon, Persia, Central Asia, Africa, Mediterranean regions.

Mr. Drummond in a paper in the 'Journal of the Asiatic Society Bengal' (v. 73, part 2 (1904) p. 137) shows that *S. subulatus*, Vahl, which in the 'Flora of British India' (*l. c.*) has been made synonymous with *S. litoralis* should be considered distinct from that species in consequence of its having a trifid style.

8. **Scirpus Kysoor,** *Roxb. Hort. Beng.* (1814) p. 6; *Fl. Ind.* v. 1 (1832) p. 230. Rootstock stoloniferous, the stolons often producing hard globose tubers $\frac{1}{2}$–$\frac{3}{4}$ in. in diam., densely clothed with matted fibres; stems straight, erect, 4–6 ft. high, triquetrous, with sharp often retrorsely hispid angles. Leaves several to each stem and about as long as the stem, $\frac{1}{2}$–$\frac{3}{4}$ in. wide, linear, acuminate, the margins and keel somewhat hispid when young. Umbel terminal, supra-decompound, very

similar to that of *Scirpus grossus*; bracts 3, very unequal, the longest often 2 ft. or more long, the shortest 2–3 in., leaf-like. Spikelets $\frac{1}{8}$–$\frac{1}{4}$ in. long, subglobosely ovoid, brown. Glumes $\frac{1}{8}$ in. long, broadly ovate or suborbicular, membranous, reddish-brown, with a strong keel in the upper part produced into a straight or slightly recurved mucro about $\frac{1}{10}$ in. long. Stamens 3, reaching $\frac{1}{8}$ in. long; hypogynous bristles 5, plumose with many minute multicellular hairs. Nut $\frac{1}{12}$ in. long, obovoid, trigonous, with pyramidal apex, smooth, yellow; style $\frac{1}{16}$ in. long with dilated red base; stigmas 3, as long as or longer than the style.

Mr. Clarke, in Hook. f. Fl. B. I. (*l. c.*), gives the number of hypogynous bristles as 6. Roxburgh (*l. c.*) says 5, and I have invariably found 5 in many specimens that I have examined. Graham, Cat. p. 233; Dalz. & Gibs. p. 288; Watt, Dict. Econ. Prod. v. 6, part 2, p. 490. *Scirpus grossus* var. *Kysoor*, C. B. Clarke, in Hook. f. Fl. B. I. v. 6 (1893) p. 660; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1159.—Flowers: Sept. VERN. *Kachar*.

KONKAN: beds of rivers in both Konkans, *Graham*; Bombay, *Dalzell!*, cultivated, *Woodrow*.—DISTRIB. More or less throughout India, sometimes cultivated.

The tubers are dug up in the cold season, sliced and eaten by the natives in many parts of India. They are sweet and starchy and are considered cooling and highly nutritious (*Watt*).

9. **Scirpus Kyllingioides,** *Boeck. in Linnæa*, v. 36 (1870) p. 733. Perennial, glabrous; stem 3–6 in. long, slender, with thickened base and sometimes with long slender stolons. Leaves $\frac{1}{2}$–$\frac{3}{4}$ the length of the stem, $\frac{1}{20}$ in. broad, green, keeled, narrowed above and with very minutely dentate margins. Head terminal, $\frac{1}{8}$–$\frac{1}{4}$ in. in diam., of 5–15 spikelets; bracts 3, leaf-like, spreading or reflexed, 1–3 in. long. Spikelets very small, closely packed, ovoid-lanceolate, many-flowered. Glumes ovate-lanceolate or oblong-lanceolate, subacute, keeled, many-nerved, straw-colored; hypogynous bristles 0. Stamens 2 or 3; filaments scabrous; anthers small, not crested. Nut obovoid-oblong, minute, scarcely half as long as the glume, equally trigonous or subcompressed, obtuse, shortly apiculate, yellowish-black or reddish, minutely punctulate; style slender, shorter than the nut; stigmas 3. Fl. B. I. v. 6, p. 662; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1158.

KANARA: *Young* ex *C. B. Clarke* (Fl. B. I. l. c.).

I have not seen any Bombay specimens; there are none in Herb. Kew.—DISTRIB. India (N.-West, Bengal, Rajputana, W. Peninsula); Tropical Africa.

10. **Scirpus Michelianus,** *Linn. Sp. Pl.* (1753) p. 52. A small glabrous tufted annual; roots fibrous; stems 2–5 in. high, triquetrous, leafy towards the base and there brown. Leaves as long as or sometimes longer than the stem, grass-like, narrowly linear, acute. Spikelets numerous, in dense compound terminal heads $\frac{1}{4}$–$\frac{3}{4}$ in. in diam. (generally 1 head in the middle and 4 or 5 in the circumference); bracts many, the longest sometimes reaching $3\frac{1}{2}$ in. long, leaf-like, linear, dilated at the base, acute at the apex. Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. long, oblong, subterete, straw-colored. Glumes $\frac{1}{12}$ in. long, elliptic, hyaline, with a long mucro about $\frac{1}{4}$ the length of the blade, 3-nerved on the back. Stamens usually 2. Nut $\frac{1}{25}$ in. long, fusiform, smooth, pale yellow, minutely

punctate and with (microscopically) narrow hyaline margins; style scarcely $\frac{1}{50}$ in. long, reddish-brown; stigmas 2, as long as or longer than the style, recurved. Fl. B. I. v. 6, p. 662; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1158. *Cyperus diffusus*, Roxb. Fl. Ind. v. 1 (1832) p. 189. *C. pygmæus* var. *β*, Boeck. in Linnæa, v. 35 (1868) p. 494.—Flowers: Oct.

KONKAN: *Woodrow*. GUJARAT: Pali, *Woodrow*. SIND: Bhubak, *Woodrow*.—DISTRIB. Throughout India; Europe, Asia, Algeria.

11. **Scirpus squarrosus,** *Linn. Mant.* (1771) p. 181. A slender glabrous tufted annual; root-fibres capillary; stems 3–6 in. long, filiform, terete, striate. Leaves shorter than the stem, filiform, acuminate, erect, smooth, with involute margins; sheaths short, open. Spikelets solitary or 2–4 in a cluster, sessile, $\frac{1}{8}$–$\frac{1}{4}$ in. long, globose or oblong, obtuse, green, many-flowered; rhachilla naked; bracts 1–3, capillary, finely acuminate, leaf-like, dilated at the base, one or two sometimes 1 in. long. Glumes $\frac{1}{20}$ in. long, closely imbricate, squarrosely spreading and recurved, trapeziform with acutely angled sides, narrowed above into a recurved cusp as long as or longer than the blade with a stout central nerve, very caducous in fruit; hypogynous bristles 0. Stamens 1 or 2; anthers minute, oblong, apiculate, yellow. Nut $\frac{1}{50}$ in. long, obovoid-ellipsoid, trigonous, yellow, brown or ultimately black; style very short or 0; stigmas 3, minute, recurved. Fl. B. I. v. 6, p. 663; Grah. Cat. p. 233; Boeck. in Linnæa, v. 36 (1870) p. 734; Trim. Fl. Ceyl. v. 5, p. 74; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1158. *Isolepis squarrosa*, Rœm. & Schult. Syst. v. 2 (1817) p. 111; Dalz. & Gibs. p. 286.—Flowers: Oct.–Dec.

Widely distributed throughout the Presidency.—DISTRIB. More or less throughout India; Ceylon, Tropical Africa, Java, China.

8. **ERIOPHORUM,** Linn.

Glabrous herbs; stem leafy only near the base. Leaves many, long, linear. Spikelets with many perfect flowers in compound umbels. Glumes imbricate on all sides; hypogynous bristles 6, divided nearly to the base into ligulate comose segments. Stamens 3–1 on the anterior side of the ovary. Ovary ovoid; style slender, glabrous, short or long; stigmas 3 (casually 2 or 4), long. Fruit a sessile trigonous smooth dusky nut with narrowed apex.—DISTRIB. Species 10, chiefly in Arctic or N. temperate regions.

1. **Eriophorum comosum,** *Wall. Cat.* (1828) 3446. A glabrous herb; rhizome scarcely any; stems 6–20 in. long, terete below, trigonous at the top, leafy at the very base. Leaves equalling or exceeding the stem, rigid, linear, narrow, with serrulate margins; sheaths brown, shining, striate. Umbel supra-decompound, 2–8 in. in diam., with many rays, the spikelets usually solitary on the top of the rays with 1 or 2 sessile ones in the forks; bracts very long, sometimes reaching 12 in., leaf-like. Spikelets numerous, reaching $\frac{1}{4}$ in. long, elliptic-oblong, obtuse, terete, reddish-brown. Glumes $\frac{1}{8}$ by $\frac{1}{30}$ in., oblong-lanceolate, membranous, 1-nerved, mucronate, reddish-brown. Anthers large, yellow with a long lanceolate pointed bright-red crest. Nuts nearly

$\frac{1}{8}$ in. long by about $\frac{1}{50}$ in. wide, linear-oblong or subfusiform, trigonous, acute, shining, greyish-black, with numerous erect white bristles reaching $\frac{1}{3}$ in. long at the base; style $\frac{1}{16}$–$\frac{1}{12}$ in. long, reddish-brown; stigmas 3, as long as the style, reddish-brown, much exserted. Fl. B. I. v. 6, p. 664; Dalz. & Gibs. p. 289; Boeck. in Linnæa, v. 37 (1871) p. 98; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1157; Watt, Dict. Econ. Prod. v. 3, p. 266.—Flowers: Oct.

DECCAN: W. Deccan, near Junnar, *Dalzell & Gibson*; near Junnar, *Bhiva*! GUJARAT: Champanir, *Woodrow*. SIND: *Pinwill*!—DISTRIB. Throughout India; Tonkin. China.

The plant is used to make ropes and mixed with *Ischæmum angustifolium* is often exported to the plains from the Himalayas (see Watt, Dict. Econ. Prod. l. c.).

9. **FUIRENA,** Rottb.

Annual or perennial, glabrous or pubescent leafy herbs. Leaves linear-lanceolate; sheaths entire, with an annular membrane at the mouth. Spikelets many-flowered, in dense axillary pedunculate and terminal clusters. Glumes imbricate all round the rhachilla, orbicular or ovate-oblong, membranous, with a stout 3-nerved keel ending in a cusp or stout scabrid awn; hypogynous bristles 3, minute, or 0; hypogynous scales (*petals*) 3, enclosing the nut, linear, quadrate or obovate, strongly 3-nerved, glabrous or ciliate. Stamens 2–3. Ovary trigonous; style slender, finally deciduous; stigmas 3. Fruit a trapezoidal trigonous nut, narrowed or stipitate below, with a long or short cusp or beak above, the angles acute, the sides smooth, pale.—DISTRIB. Species 25, scattered through all warm regions.

Hypogynous scales (*petals*) 0	1. *F. Wallichiana.*
Hypogynous scales (*petals*) present, quadrate or obovate.	
Annuals; leaves hairy.	
Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long; rhachilla slender; claw of petals as long as the blade	2. *F. glomerata.*
Spikelets $\frac{1}{8}$–$\frac{1}{4}$ in. long; rhachilla obsolete; claw of petals shorter than the blade	3. *F. uncinata.*
Perennial; rhachilla slender; petals sessile or nearly so	4. *F. umbellata.*

1. **Fuirena Wallichiana,** *Kunth, Enum.* v. 2 (1837) p. 182. Rhizome creeping, short or long; stems many, 1–1½ ft. high (rarely higher), triquetrous, more or less pubescent towards the apex. Leaves 2–8 by $\frac{1}{6}$–$\frac{1}{4}$ in., linear-lanceolate, acute, with a strong midnerve and recurved margins; sheaths long, trigonous, striate, with a short ligule. Spikelets in corymbose terminal clusters; bracts small. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long, oblong, terete, many-flowered. Glumes $\frac{1}{8}$ in. long (not including the stout conical slightly hairy mucro, which reaches $\frac{1}{20}$ in. long), broadly oblong, rounded at the apex below the mucro, green with red streaks by transmitted light, pubescent and ciliate; hypogynous bristles shorter than the nut, reddish-brown; hypogynous scales (*petals*) 0. Anthers linear-oblong, not crested. Nut $\frac{1}{20}$ in. long, turbinate, with a conical pubescent apex, trigonous, longitudinally ribbed, trabeculate between the ribs, pale yellow; style $\frac{1}{16}$ in. long; stigmas 3, about as long as the style. Fl. B. I. v. 6, p. 665; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432. *Fuirena cuspidata,* Kunth, Enum. v. 2 (1837) p. 187;

Dalz. & Gibs. p. 286. *F. pubescens*, Boeck. in Linnæa, v. 37 (1871) p. 104 (*not* of Kunth).—Flowers: Sept.

DECCAN: watery places, *Dalzell*!; Poona, *Woodrow*, 882!, *Jacquemont*, 413!—DISTRIB. India (N.-West, Central India, W. Peninsula).

2. **Fuirena glomerata,** *Lam. Illust.* v. 1 (1791) p. 150. Annual; stems 4–16 in. long, slender, erect, leafy, sparsely hairy above, glabrous or nearly so below. Leaves 2–5 by $\frac{1}{6}$–$\frac{1}{4}$ in., linear-lanceolate, acuminate, 3–5-nerved, hairy; sheaths long, closed, striate. Spikelets clustered, approximate; bracts 0 but the leaf under each cluster of spikelets. Spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., ovoid or oblong, obtuse, brown; lowest glumes longest, empty. Glumes $\frac{1}{8}$ in. long (including the stout hairy awn which sometimes reaches $\frac{1}{20}$ in. long), squarrosely imbricate, at length deciduous, membranous, obovate-oblong, obtuse, the keel ending in a long awn, the tip ciliolate, the back sometimes with a few bristles; hypogynous scales (*petals*) nearly $\frac{1}{20}$ in long, with a slender stalk about equalling the blade, the blade quadrate, strongly 3-nerved, with 3 acute lobes or teeth at the apex, of which the middle one is the longest, hastate or cordate at the base, brown, membranous. Nut $\frac{1}{30}$ in. long, stipitate, trigonous with acute angles, subrotund or broadly obovoid, cuspidate, smooth, pale; style $\frac{1}{30}$ in. long; stigmas 3, nearly as long as the style. Fl. B. I. v. 6, p. 666; Boeck. in Linnæa, v. 37 (1871) p. 107; Trim. Fl. Ceyl. v. 5, p. 79; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1157. *Fuirena ciliaris*, Roxb. Hort. Beng. (1814) p. 81; Grah. Cat. p. 232.—Flowers: Nov.

KONKAN: *Stocks*!, *Law*!; Sávantvadi, *Woodrow*. GUJARAT: Godra, *Woodrow*.—DISTRIB. Throughout the warmer parts of India, common in rice-fields; Ceylon, Tropical Africa, S.E. Asia, and Australia.

3. **Fuirena uncinata,** *Kunth, Enum.* v. 2 (1837) p. 184. Annual; stems 4–12 in. long, rather stout, leafy, glabrous below, more or less pubescent above. Leaves 2–6 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear-lanceolate, acuminate, membranous, 3–5-nerved, laxly hairy on both sides; sheaths long, closed, hairy. Spikelets $\frac{1}{5}$–$\frac{1}{3}$ in. long, densely crowded in capitate axillary, sessile or pedunculate, simple or lobed clusters $\frac{1}{4}$–$\frac{1}{2}$ in. in diam., pale-brown; lowest glumes longest, empty, with a broad membranous blade and rather longer awn than the others; rhachilla scarcely any; bracts at the base of the clusters like large glumes within which are a few very short broad hyaline ciliate scales unlike either the bracts or glumes. Glumes $\frac{1}{8}$ in. long (excluding the recurved stout laxly hairy mucro $\frac{1}{16}$ in. long), obovate, obtuse, cymbiform, pubescent on the back, hispid and hispidly ciliate at the apex, 5-nerved; hypogynous scales quadrate, shortly clawed, $\frac{1}{25}$ in. long, with a short scabrid awn at the apex and often a minute triangular tooth at each side of the awn. Nut $\frac{1}{30}$ in. long, shortly stalked, obovoid, trigonous, with a curved beak, pale, almost white; style longer than the nut; stigmas 3, nearly as long. I have not found the awns of the glumes *hooked* as stated by Mr. Clarke, but merely *recurved*. Fl. B. I. v. 6, p. 666; Boeck. in Linnæa, v. 37 (1871) p. 108; Trim. Fl. Ceyl. v. 5, p. 79; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432.—Flowers: Dec.

KANARA: *Thomson*!—DISTRIB. India (W. Peninsula); Ceylon.

4. **Fuirena umbellata,** *Rottb. Descrip. et Icon.* (1773) p. 70, t. 19, fig. 3. Perennial; rhizome creeping, stout, horizontal, woody, with filiform root-fibres; stems 1–4 ft. long, stout or slender, striate and ribbed, glabrous or nearly so, with nodes throughout their length. Leaves variable, 6–10 in. long, up to $\frac{2}{3}$ in. broad, linear-lanceolate, acuminate, 3–5-nerved, often ciliate towards the base, the margins smooth or nearly so; sheaths long, closed at the mouth, with a small brown ligule. Spikelets $\frac{1}{4}$–$\frac{3}{8}$ by $\frac{1}{8}$ in., sessile, oblong, crowded in simple or compound axillary and terminal pedunculate sometimes subpaniculate dark-brown clusters $\frac{1}{2}$–1 in. in diam., with tomentose or villous peduncles; rhachilla slender; bracts beneath the clusters short, cuspidate. Glumes closely imbricate, at length deciduous, $\frac{1}{10}$ in. long (not including the mucro), obovate-oblong, rounded or sometimes slightly retuse at the apex, membranous, pubescent on the back and with the upper margins ciliate, strongly 3-nerved, the nerves uniting into a strong, more or less hairy mucro about $\frac{1}{25}$ in. long; hypogynous scales (*petals*) $\frac{1}{20}$ in. long, nearly sessile, quadrate-obovate, reddish-brown, 3-nerved, the upper margin thickened, apiculate. Stamens 3. Nut $\frac{1}{20}$–$\frac{1}{16}$ in. long, trapezoidally obovoid, stipitate, trigonous with sharp angles, chestnut-brown, smooth, with a long pale beak; style $\frac{1}{25}$ in. long; stigmas 3, as long as the style. Fl. B. I. v. 6, p. 666; Boeck. in Linnæa, v. 37 (1871) p. 110; Trim. Fl. Ceyl. v. 5, p. 80; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1157.—Flowers: Nov.

Deccan: Alandi, *Woodrow.* S. M. Country: Londa, *Woodrow.*—Distrib. More or less throughout India; Ceylon, most warm (not too dry) countries.

10. HYPOLYTRUM, L. C. Rich.

Stout perennial herbs with a woody rootstock and very stout root-fibres; stem erect, trigonous, leafy. Leaves long, narrow, linear or ensiform, coriaceous, 3-nerved. Spikelets small, ovoid or subglobose, in broad subumbellate panicles with stout spreading branches, or the panicle contracted into a more or less compact lobed head; bracts leaf-like. Glumes containing 1 hermaphrodite flower having 2 opposite, lateral, keeled, free or connate hypogynous scales (or bracteoles) containing 2 (rarely 3) stamens and a pistil; hypogynous bristles 0. Stamens 2 (rarely 3); filaments elongate. Ovary terminal, flattened, beaked; style continuous with the ovary, early deciduous; stigmas 2–3, filiform, sometimes thickened at the apex. Fruit a rounded or obtusely angled nut with a thick hard endocarp, beaked, often with vein-like sculpturing.—Distrib. Tropical regions of both hemispheres; species 39.

Mr. Clarke regards the whole not as a single flower, but as an inflorescence with the glumes between the stamens and pistil undeveloped.

1. **Hypolytrum Wightianum,** *Boeck. in Linnæa,* v. 37 (1871) p. 130. Glaucescent; root-fibres stout; stem slender, 2–3 ft. long, trigonous, scarcely as thick as a goose-quill, quite smooth. Leaves rather rigid, often longer than the stems, linear, acuminate, flat or with the basal portion complicate, 3-nerved, $\frac{1}{2}$–$\frac{5}{8}$ in. broad, the margins and midrib spinulose towards the top. Spikelets in dense compound

corymbose depressed panicles; bracts leaf-like, 2–6 in. long. Spikelets $\frac{1}{6}$–$\frac{1}{3}$ in. long, sessile or shortly pedicellate, subglobose or oblong-cylindric. Glumes $\frac{1}{10}$–$\frac{1}{8}$ in. long, oblong, obtuse, sometimes apiculate, 1-nerved, with scarious margins, brown speckled with minute darker spots; hypogynous scales (or bracteoles) 2 at the base of the nut, $\frac{1}{10}$ by $\frac{1}{25}$ in., oblong, obtuse, cymbiform, scarious, with a scabrous or hairy keel. Stamens 2; filaments long, slender; anthers linear-oblong. Nut $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovoid-lanceolate, terete or slightly compressed, beaked, veined below with stout obtuse veins, yellow, minutely dotted with darker spots; style short; stigmas 2. Fl. B. I. v. 6, p. 678; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432.—Flowers: Dec.–Feb.

Stocks without locality in Herb. Kew.! S. M. COUNTRY: Castlerock, *Kanitkar*! KANARA: *Dalzell*!; Katgal (N. Kanara), *Woodrow*!—DISTRIB. India (W. Peninsula, Nicobars).

11. **RHYNCHOSPORA,** Vahl (*Rynchospora*).

Usually tall herbs; stems simple, leafy throughout (rarely at the base only), stout or slender. Leaves narrow, often filiform. Spikelets small, ovoid, capitate, corymbose, subumbellate or paniculate, with 1 or 2 bisexual flowers; bracts various. Glumes imbricate all round the rhachilla, membranous or coriaceous, 1-nerved, the 3 or 4 lower shorter, empty, the next 1 or 2 fertile, the uppermost empty; hypogynous bristles 0 or 6 (rarely fewer), scabrid with teeth pointing upwards. Stamens 1–3; anthers linear. Ovary rounded; style slender, glabrous, with conical base; stigmas 2. Nut ovoid or subglobose, turgidly biconvex, smooth or transversely waved, crowned by the conical much enlarged often very long and stout persistent style-base.—DISTRIB. Species 150, in the warmer regions of the world, numerous in America.

Stem leafy towards the base only; spikelets in a single terminal head.	
Nut biconvex, $\frac{1}{10}$ in. long	1. *R. Wallichiana.*
Nut flattened, $\frac{1}{8}$ in. long	2. *R. Wightiana.*
Stem leafy throughout its entire length; spikelets in paniculately arranged corymbs	3. *R. aurea.*

1. **Rhynchospora Wallichiana,** *Kunth, Enum.* v. 2 (1837) p. 289. Stems 6–24 in. high, leafy at the base only, tufted, slender, striate, trigonous. Leaves shorter than the stem, narrowly linear, up to $\frac{1}{8}$ in. broad, flat or complicate, narrowed from the sheath to the tip, acute. Head of spikelets globose, terminal, brown, shining, $\frac{3}{8}$–$\frac{5}{8}$ in. in diam.; bracts 3–8, spreading or deflexed, 1–3 in. long, linear-lanceolate, acute. Spikelets $\frac{3}{8}$ in. long, sessile, densely clustered in a terminal head, lanceolate, acute. Glumes glabrous, shining, chestnut-brown, the lowest 3–4 short, ovate-lanceolate, empty, the fertile glumes $\frac{3}{8}$ in. long, ovate-lanceolate, acuminate; hygogynous bristles if present as long as the nut or shorter, scabrid with teeth pointing upwards. Stamens 2–3; anthers with an acute tip. Nut nearly $\frac{1}{10}$ in. long, with a rather long stalk, turgidly biconvex, strongly margined, with a conical beak, nearly black; style very slender; stigmas 2, very long. Fl. B. I. v. 6, p. 668; Boeck. in Linnæa, v. 37 (1871) p. 542; Trim. Fl. Ceyl. v. 5, p. 83; Woodr. in

Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1134.—Flowers: Aug.

KONKAN: Kalyan, *Woodrow.*—DISTRIB. Throughout India (except the North-West); Ceylon, Malaya, Japan, Tropical Africa, and Tropical Australia.

2. **Rhynchospora Wightiana,** *Steud. Cyp.* (1855) p. 148. Stems tufted, 6–16 in. long, slender, trigonous, glabrous; stolons 0. Leaves many, at the base of the stem only and $\frac{1}{4}$–$\frac{3}{4}$ its length, linear, acuminate, grass-like, $\frac{1}{10}$ in. broad. Spikelets numerous, in reddish-brown heads $\frac{3}{8}$–$\frac{5}{8}$ in. in diam.; bracts 3–6, unequal, the longest reaching 3 in. long, linear-lanceolate, acuminate, dilated and ciliate at the base. Spikelets $\frac{1}{4}$–$\frac{3}{8}$ in. long, lanceolate, acute, reddish-brown, smooth and shining. Glumes 6–7, elliptic-lanceolate, very acute, $\frac{1}{4}$ in. long, the 3 or 4 lowest empty, the next 2-sexual and larger than the lower ones, the upper male or rudimentary; hypogynous bristles 6, unequal, $\frac{1}{6}$–$\frac{1}{4}$ in. long, slender, scabrous with numerous minute teeth pointing upwards, brown. Nut $\frac{1}{8}$ in. long, compressed, rounded at the apex below the beak, oblong, dark brown, with pale papillæ; beak $\frac{1}{20}$ in. long, compressed-conical, nearly white; style $\frac{1}{8}$ in. long, very slender, brown; stigmas 2, very minute. Fl. B. I. v. 6, p. 669; Boeck. in Linnæa, v. 37 (1872) p. 544; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432.—Flowers: Aug.

KONKAN: *Law*!; Bombay without authority in Herb. Kew.! DECCAN: Khandala, *Jacquemont*, 649!, *Woodrow*; Poona, *Woodrow.*—DISTRIB. India (W. Peninsula); Cochinchina.

3. **Rhynchospora aurea,** *Vahl, Enum.* v. 2 (1806) p. 229. Root-fibres stout; stems 2–3 ft. long, leafy throughout, trigonous with smooth angles; stolons 0. Leaves 1–2 ft. by $\frac{1}{2}$–$\frac{3}{4}$ in., contracted at the sheath, then narrowed to the acute tip, flat, the margins and the slender keel scabrid; sheaths of the upper leaves closed, those of the lower open. Spikelets clustered or spicate at the ends of the branches of large corymbiform decompound terminal and axillary umbels; bracts up to 6 in. long. Spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long, narrowly ovoid, acuminate, reddish-brown. Glumes 6–7, the 3 or 4 lower empty, ovate, mucronate or awned, the next 2-sexual reaching $\frac{1}{4}$ in. long, ovate, mucronate or awned, 1-nerved, keeled, cymbiform, the upper male or empty; hypogynous bristles 6 or fewer, very slender, scaberulous, shorter than the nut. Nut (including the beak) reaching $\frac{1}{3}$ in. long, brown, often exserted from the glume, the portion below the beak obovoid, compressed, with slightly undulate faces; beak reaching $\frac{1}{5}$ in. long, conical, hard, acute, as broad as the nut at the base and broadly channelled down the centre; style long, slender; stigmas 2, very minute. Fl. B. I. v. 6, p. 670; Boeck. in Linnæa, v. 37 (1873) p. 626; Trim. Fl. Ceyl. v. 5, p. 83; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1134. *Rhynchospora articulata*, Roem. & Schult. Syst. Mant. v. 2 (1824) p. 49; Dalz. & Gibs. p. 288. *Schœnus articulatus*, Roxb. Hort. Beng. (1814) p. 81; Grah. Cat. p. 233.

S. M. COUNTRY: *Young* ex *Woodrow.*

This plant is given both by Graham and Dalzell & Gibson, neither of whom has assigned any locality to it. There are no specimens from Bombay in Herb. Kew.—DISTRIB. More or less throughout India; Ceylon, warm regions of the globe.

12. **REMIREA,** Aublet.

A low creeping branched rigid glabrous perennial, growing on sandy shores of sea-coasts; rhizome or subterranean stem sometimes several feet long, rooting at the nodes, giving off short, erect, densely leafy flowering branches; internodes of the rhizome often long, reaching 1–2 in.; sheaths scarious, acuminate; flowering branches clothed below with imbricating scarious sheaths. Leaves numerous on the branches, rigid, spreading and recurved, pungent; sheaths very short, open. Spikelets small, short, 1-flowered, crowded in a terminal ovoid solitary or lobed head. Glumes 4, the 3 lower empty, the second and third larger than the lowest, suborbicular, concave, the upper fertile very thick, corky, 1-flowered; hypogynous bristles 0. Stamens 3; anthers linear, acute. Nut closely embraced by the 2 upper glumes, linear-oblong, obtusely trigonous, beaked; style very short, thickened at the base; stigmas 3, short.—DISTRIB. Sea-coasts in Tropical countries.

1. **Remirea maritima,** *Aubl. Hist. Pl. Guian.* v. 1 (1775) p. 45. Rhizome as thick as a crow-quill, curved, hard, terete, horizontally creeping; sheaths leafless, as long as or sometimes longer than the internodes, acuminate. Branches erect or ascending, 2–6 in. long, simple, sheathed in the lower part with stout ovate acute finely striate scarious sheaths, densely leafy above often to the apex. Leaves crowded, rigid, recurved, linear, narrowed above, keeled and channelled, with infolded sides, triquetrous and pungent at the apex. Heads of spikelets solitary or 3 or more close together; bracts 3–4, leaf-like, usually longer (rarely shorter) than the heads. Spikelets sessile or very shortly pedunculate, $\frac{1}{6}$–$\frac{1}{5}$ in. long and broad; lowest glume small, the next 2 larger, broadly ovate or suborbicular, concave, multistriate, coriaceous, with scarious margins; flowering glume oblong, cymbiform, nearly as long as the outer glumes, smooth, ultimately corky, pale brown, closely embracing the nut. Stamens 3; filaments long, flat. Nut $\frac{1}{8}$ in. long, oblong, tapering at both ends, compressed, minutely punctulate, dark brown or nearly black; style hardly $\frac{1}{30}$ in. long; stigmas 3, short, but longer than the style. Fl. B. I. v. 6, p. 677; Boeck. in Linnæa, v. 35 (1868) p. 435; Trim. Fl. Ceyl. v. 5, p. 87; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432.

KANARA: *Thomson!, Talbot* ex *C. B. Clarke.*—DISTRIB. Sea-coasts in India; Ceylon, most tropical sea-coasts.

13. **SCLERIA,** Berg.

Perennial (rarely annual) erect leafy herbs; stems trigonous or triquetrous. Leaves narrow or broad. Flowers all unisexual. Spikelets dimorphic, androgynous or male, and female, solitary or clustered on the branches of a panicle, mixed with hyaline scales (rarely spicate or capitate); bracts often foliaceous; bracteoles usually filiform. Glumes 1-nerved. MALE OR ANDROGYNOUS SPIKELETS narrow. Glumes many, the 5–6 lower distichous, the intermediate convolute, membranous, enclosing many narrowly linear hyaline scales. Stamens 1–3; anthers narrowly linear, cuspidate. Ovary sterile or 0. FEMALE SPIKELETS shorter, broader, 1-flowered. Glumes 3 or more, distichous, the lower

2–3 empty, the next above fertile, the upper empty. Disk at the base of the ovary annular (rarely obscure), often enlarged and lobed in fruit. Ovary minute; style slender; stigmas 3. Fruit a globose or oblong nut, usually white and polished, smooth or sculptured.—DISTRIB. Most tropical and subtropical regions; species about 160.

Disk of female flowers 0	1. *S. lithosperma.*
Disk of female flowers cupular or 3-lobed.	
Disk cupular	2. *S. annularis.*
Disk 3-lobed.	
Leaves $\frac{1}{10}$–$\frac{1}{8}$ in. broad.	
Nut tessellately cancellate	3. *S. tessellata.*
Nut smooth	4. *S. hebecarpa.*
Leaves $\frac{1}{4}$–$\frac{1}{3}$ in. broad.	
Disk 1-seriate; nut globose, $\frac{1}{12}$ in. in diam.	5. *S. biflora.*
Disk 2-seriate; nut ellipsoid, $\frac{1}{8}$–$\frac{1}{3}$ in. long	6. *S. Stocksiana.*

1. **Scleria lithosperma,** *Sw. Prodr.* (1788) p. 18. Rhizome hard, elongate, horizontal, nodose; root-fibres slender, wiry; stems not tufted, 1½–3 ft. long, very slender, trigonous, smooth. Leaves as long as or shorter than the stem, narrowly linear, $\frac{1}{20}$—$\frac{1}{12}$ in. broad, narrowed to the subobtuse tip; sheaths trigonous, closed, glabrous or hairy. Spikelets few, subsolitary, distant on the filiform rhachis and on the few distant branches of slender terminal and axillary subspiciform panicles, dark-brown; bisexual spikelets many; bracts and bracteoles long, slender, almost capillary. Fruiting spikelets $\frac{1}{10}$ in. long. Glumes broadly ovate, cuspidately acuminate. Disk-lobes obsolete. Nut $\frac{1}{10}$ in. long, broadly ellipsoid, obtusely trigonous, smooth, polished, white; style about $\frac{1}{30}$ in. long; stigmas 3, longer than the style. Fl. B. I. v. 6, p. 685; Grah. Cat. p. 233; Dalz. & Gibs. p. 288; Boeck. in Linnæa, v. 38 (1874) p. 451; Trim. Fl. Ceyl. v. 5, p. 96; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1132.—Flowers: Dec.

KONKAN: Matheran, *Woodrow.* KANARA: *Talbot,* 562, ex *C. B. Clarke.*—DISTRIB. Throughout India (except the West arid area); Ceylon, most warm regions except Continental Africa.

2. **Scleria annularis,** *Kunth, Enum.* v. 2 (1837) p. 359. Root fibrous; rhizome 0; stem erect, 1–2 ft. high, compressed, triquetrous, slender, scabrous at the apex with spinules pointing downwards. Leaves 6–12 by $\frac{1}{5}$ in., linear, subacute, keeled, 3-nerved, the margins and keel scabrous; sheaths 3-winged, hairy or glabrous. Panicles axillary, remote, subspicate, rather dense, oblong, 1–2 in. long; bracteoles conspicuous, linear-lanceolate, acuminate, leaf-like. Spikelets oblong, acute. Glumes $\frac{1}{6}$ in. long, reddish-brown, ovate-lanceolate, cuspidate, acutely keeled, the keel spinulose above. Nut $\frac{1}{10}$ in. long, ellipsoid, terete or obscurely trigonous, rounded at the apex, smooth, white. Disk shallowly cup-shaped, small, brown, not lobed, closely appressed to the base of the nut. Fl. B. I. v. 6, p. 687; Boeck. in Linnæa, v. 38 (1874) p. 456; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432.

KONKAN: *Stocks!, Law!* KANARA: *Law!*—DISTRIB. India (N.-West, Central India, W. Peninsula); China.

3. **Scleria tessellata,** *Willd. Sp. Pl.* v. 4 (1805) p. 315. Root fibrous, the fibres very dark, nearly black; stems many, tufted, slender, 1–2½ ft. long, triquetrous. Leaves 6–12 by $\frac{1}{10}$ in. or less, linear, sub-

acute or obtusely acuminate, rigid, 3-nerved, with involute scaberulous margins; sheaths trigonous, closed, the mouth truncate. Spikelets solitary or in small clusters on the branches of narrow erect terminal and subterminal sparingly branched panicles 2–3 in. long; bracteoles filiform. Fruiting spikelets $\frac{1}{10}$ in. long. Glumes 3, broadly ovate, acuminate, dark brown. Disk-lobes small, thick, triangular, obtuse, creamy-white. Nut globose, $\frac{1}{10}$ in. in diam., tessellately cancellate in vertical lines, top rounded, not beaked, white, not or rarely puberulous with reddish hairs on the ridges. Fl. B. I. v. 6, p. 686; Boeck. in Linnæa, v. 38 (1874) p. 470; Trim. Fl. Ceyl. v. 5, p. 98; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1132.

KONKAN: near Pánvel, *Jacquemont*!—DISTRIB. Throughout India (except the West arid area); Ceylon, Malaya, China, Japan, Australia.

4. **Scleria hebecarpa,** *Nees, in Linnæa*, v. 9 (1835) p. 303. Rhizome woody, nodose; root-fibres stout; stem 2–3 ft. long or more, triquetrous. Leaves 10–12 by $\frac{1}{5}$–$\frac{1}{3}$ in., narrowed to the obtuse tip, multistriate, flat, 3-nerved, rigid, usually with scabrous margins; sheaths trigonous, closed, the mouth truncate, with an ovate coriaceous pubescent ligule, the sheaths of the middle stem-leaves winged. Spikelets all unisexual, solitary or in small clusters on the suberect branches of narrow terminal and subterminal sparingly branched panicles 2–3 in. long; bracts 2–4 in. long, leaf-like; bracteoles filiform, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Fruiting spikelets $\frac{1}{8}$ in. long. Glumes 3, the upper broadly ovate, cuspidate. Disk-lobes triangular-ovate, acute, with a broad sinus, $\frac{1}{4}$–$\frac{1}{3}$ the height of the nut. Nut $\frac{1}{8}$ in. long, globose or broadly ovoid, obscurely trigonous, apiculate, white, smooth, polished. Fl. B. I. v. 6, p. 689; Boeck. in Linnæa, v. 38 (1874) p. 478; Trim. Fl. Ceyl. v. 5, p. 99; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432.

KONKAN: *Stocks*!, *Law*! KANARA: N. Kanara, *Talbot* ex *Woodrow*.—DISTRIB: Throughout India (except the N.W. arid region); Ceylon, Malaya, China, Japan, Australia, Polynesia.

5. **Scleria biflora,** *Roxb. Fl. Ind.* v. 3 (1832) p. 573. Root fibrous; stems tufted, 1–2 ft. long, trigonous, slender, leafy. Leaves 6–10 by $\frac{1}{4}$–$\frac{1}{3}$ in., ensiform, obtuse or subacute, thin, flat, 3-nerved, the margins smooth or scaberulous; sheaths loose, closed, trigonous, the mouth truncate. Spikelets solitary or in small clusters on the branches of slender, erect, terminal and subterminal, sparingly branched panicles 2–3 in. long; bracteoles filiform, $\frac{1}{4}$–$\frac{5}{8}$ in. long. Fruiting spikelets $\frac{1}{10}$ in. long. Glumes 3, broadly ovate, acuminate. Disk 3-lobed, the lobes ovate, acuminate, large, often half the length of the nut, reddish-brown. Nut globose, $\frac{1}{12}$ in. in diam., tessellately cancellate in vertical lines, pubescent on the ridges with reddish-brown hairs, shortly beaked, white. Fl. B. I. v. 6, p. 687; Trim. Fl. Ceyl. v. 5, p. 99; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432; Prain, Beng. Pl. p. 1132. *Scleria Steudeliana*, Miq. Fl. Ned. Ind. v. 3 (1859) p. 344; Boeck. in Linnæa, v. 38 (1874) p. 475.—Flowers: Dec.

Closely allied to *S. tessellata*, from which it differs in the leaves which are broader, in the disk-lobes which are much larger, and in the nut which is beaked.

KONKAN: Matheran, *Woodrow*, 77!—DISTRIB. India (*N. & E. Bengal, Cachar, W. Peninsula*); Ceylon, Malaya, S. China.

6: **Scleria Stocksiana,** *Boeck. in Linnæa,* v. 38 (1874) p. 474. Root fibrous, small; stem 6–15 in. long, erect, slender, striate, triquetrous above, scabrous on the margins, the minute spinules on the upper part pointing upwards, those below pointing downwards. Leaves 6–12 in. long, linear, acuminate, ¼ in. broad, multistriate, with scabrous margins. Panicle elongate, slender, the lower branches remote; sheaths long, striate, truncate, usually hairy at the mouth; bracts of variable length, leaf-like, 1½–½ in. broad; bracteoles narrowly linear, acute, much longer than the spikelets. Spikelets with female and androgynous flowers more or less mixed with males, oblong, obtuse. Glumes ovate-lanceolate. Nut ⅛–⅙ in. long, exceeding the glumes, globosely ellipsoid, truncate at the base, slightly umbonate at the apex, terete or obsoletely trigonous, densely cancellate-reticulate. Disk 2-seriate, the outer with 3 broad rounded spreading lobes, dark-brown with a whitish margin, the 3 inner lobes ovate, acute, closely appressed to the nut, whitish. Fl. B. I. v. 6, p. 687; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 432.

KONKAN: *Stocks!, Law!* S. M. COUNTRY: Londa, *Woodrow!* KANARA: *Woodrow,* 76!—DISTRIB. India (W. Peninsula).

14. **CAREX,** Linn.

Perennial, glabrous (rarely pubescent) grassy sedges; stems leafy, chiefly at the base; spikelets solitary or few, one terminal, the others lower down (rarely all clustered in terminal or axillary panicles or compound spikes), unisexual or androgynous, the lower spikelets female with a few males at the base or top, very rarely diœcious, uppermost often wholly male. Glumes many, imbricate all round the rhachilla, persistent or deciduous; flowers solitary in the glumes. MALE FLOWERS of 2–3 stamens; anthers linear, obtuse. FEMALE FLOWERS a compressed or triquetrous ovary enclosed in an urceolate usually 2-toothed utricle; style usually slender; stigmas 2 or 3, protruding from the utricle.—DISTRIB. Species about 500.

Spikelets short (⅝ in. long or less), numerous, arranged in compound panicles.	
Nuts 3–4; beak of utricle ½ the length of the body; style much shorter than the nut; female glumes ovate-lanceolate, shortly apiculate	1. *C. condensata.*
Nuts 6–10; beak of utricle nearly as long as the body; style nearly as long as the nut; female glumes elliptic, conspicuously aristate	2. *C. mercarensis* [var. *major.*
Spikes 1–1¼ in. long, few (3 or fewer), very remote, slender, racemosely arranged	3. *C. speciosa.*

1. **Carex condensata,** *Nees, in Wight, Contrib.* (1834) p. 123. Stem 2–3 ft. high, erect, rigid, slender, obtusely triquetrous above, smooth, leafy. Leaves long, linear, acuminate, flat, with minutely scabrous margins, ¼–⅜ in. broad, the upper exceeding the inflorescence. Panicle axillary, decompound, pale brown, concolorous, 6–8 in. long; partial panicles 1½–2½ in. long, much-branched, the upper approximate, the lower rather remote, pedunculate; bracts foliaceous with long sheaths; bracteoles beneath the spikelets filiform. Spikelets sessile, ¼–⅜ in. long, with 3–4 nuts, reddish-brown, oblong, terete, with many male flowers. Glumes reaching ⅙ in. long, ovate-lanceolate, acute, apiculate, membranous, pale brown. Utricle rather more than ⅛ in.

long, yellowish-brown, dotted with ferruginous spots, straight or slightly curved, ovoid-lanceolate, trigonous, irregularly ribbed, scabrous-pilose; beak $\frac{1}{3}$ the length of the utricle, 2-fid. Nut $\frac{1}{16}$ in. long, ellipsoid, trigonous, very shortly stipitate; style about $\frac{1}{50}$ in. long; stigmas very short. Fl. B. I. v. 6, p. 716; Boott, Carex, part 2 (1860) p. 86, tt. 247, 248. *Carex indica*, Nees, in Wight, Contrib. (1834) p. 123 (*not* of Linn.); Dalz. & Gibs. p. 288; Grah. Cat. p. 233. *C. bengalensis*, Roxb. Hort. Beng. (1814) p. 103; Boeck. in Linnæa, v. 40 (1876) p. 346.

DECCAN: Mahableshwar, *Dalzell & Gibson*. SIND: *Pinwill*.—DISTRIB. India (Himalaya and Khasia Hills).

2. **Carex mercarensis,** *Hochst. ex Steud. Syn. Pl. Cyp.* (1855) p. 194. VAR. **major,** *Steud. l. c.* Rhizome short, hard, subtuberous; root-fibres long, stout; stem erect, slender, 1–2 ft. high, firm, triquetrous, smooth. Leaves shorter than the stem, $\frac{1}{8}$–$\frac{3}{8}$ in. broad, linear, acuminate, multistriate and with a strong midrib. Inflorescence elongate; partial panicles oblong or scarcely pyramidal; branches erect, spreading; bracts foliaceous, much longer than the panicles. Spikelets $\frac{3}{8}$–$\frac{5}{8}$ in. long with distant glumes, the female flowers 6-10 in the lower part of the spikelet, the males very few at the apex. Female glumes $\frac{1}{3}$ in. long, elliptic, aristate. Utricle (including beak) $\frac{1}{3}$ in. long, trigonous, straight or slightly curved, scabrous-hairy, with numerous slender nerves; beak nearly as long as the body, shortly 2-toothed or sometimes entire. Nut $\frac{1}{12}$–$\frac{1}{10}$ in. long, ellipsoid, acutely trigonous, shortly stipitate, pale-yellow; style as long as the nut; stigmas rather shorter than the style. Fl. B. I. v. 6, p. 719. *C. mercarensis*, Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.—Flowers: Oct.

DECCAN: Mahableshwar, *Woodrow*, 791 S. M. COUNTRY: Londa, *Woodrow*. KANARA: Hulgi (N. Kanara), *Talbot* ex *Woodrow*.—DISTRIB. India (W. Peninsula).

3. **Carex speciosa,** *Kunth, Enum.* v. 2 (1837) p. 504. Glabrous; rhizome short or long; stems cæspitose, 1–1½ ft. long, slender, winged and scaberulous at the apex below the inflorescence. Leaves subbasal, often exceeding the stem, $\frac{1}{8}$–$\frac{5}{8}$ in. wide, linear, acuminate, multistriate, flat. Peduncles radical, 6–12 in. long, surmounted by narrow oblong spikes 1–1¼ by $\frac{1}{6}$ in.; male flowers in the upper third of the spike which is attenuated in the male portion; female flowers at the base of the spike; bracts foliaceous, shorter or longer than the inflorescence, shortly sheathed. Glumes broadly ovate or suborbicular, obtuse or abruptly apiculate, reaching $\frac{1}{8}$ in. long, multistriate, all green, concolorous. Utricle reaching $\frac{1}{4}$ in. long, acutely trigonous, multistriate, concave on the inner face, rounded on the back, the two interior margins slightly winged and ciliate; beak $\frac{1}{16}$ in. long, conical, truncate, 2-fid, with ciliate margins. Nut $\frac{1}{5}$ in. long, ellipsoid, trigonous, with prominent angles, stipitate, pale brown with darker markings, finely reticulate; style persistent, very stout, conical, thickened at the base; stigmas very short. Fl. B. I. v. 6, p. 729; Boott, Carex, part 1 (1858) p. 53; Boeck. in Linnæa, v. 40 (1876) p. 388; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1130. —Flowers: Oct.

KANARA: Hulgi (N. Kanara), *Talbot*, 2282!—DISTRIB. Throughout India; Borneo.

Order CXLVII. GRAMINEÆ.

Erect decumbent or creeping herbs (rarely suffruticose), or in Tribe *Bambuseæ* shrubs or trees; stems usually branched at the base, terete or compressed, with hollow or solid internodes. Leaves distichous, simple, usually long and narrow, generally parallel-nerved, with a sheathing base (*sheath*) distinct from the blade and rarely an interposed petiole; sheath split to the base (very rarely entire), with usually a transverse erect appendage (*ligule*) consisting of a membrane or a fringe of hairs at the union with the blade. Inflorescence terminal (rarely terminal and lateral), composed of variously arranged spikelets, paniculate, racemose, capitate, simply or compoundly spicate (rarely of a single spikelet). Spikelets consisting of an axis (*rhachilla*) and typically of 3 or more alternate distichous more or less heteromorphous bracts (*glumes*), of which the two lowest (*involucral glumes*) form an involucre to the spikelet and are empty, while the following (*floral glumes*) bear in their axils subsessile flowers subtended by a hyaline 2-keeled or 2-nerved dorsal scale (*palea*); floral glumes differing usually in structure and size from the involucral glumes, and forming with the palea and the flower proper false flowers (*florets*), which are alike or different in structure and sex. Flowers hermaphrodite or 1-sexual (often with the rudiments of the other sex), consisting of 2 (rarely 3) minute hyaline fleshy scales (*lodicules*) which represent a perianth (sometimes absent), and of stamens or a pistil or both. Stamens usually 3 (rarely 6, 4, 2, or 1, very rarely more), hypogynous; filaments slender, usually free; anthers versatile, fugacious, with 2 parallel cells, usually dehiscing by a longitudinal slit. Ovary entire, 1-celled; ovule erect, anatropous; styles 2 (rarely 3 or 1), free or connate at the base, usually elongate and exserted from the apex or sides of the spikelet, clothed with simple or branched stigmatic hairs. Fruit a seed-like grain, free within the flowering glume and palea or adnate to either or both; pericarp very thin (rarely thick and separable from the seed). Seed erect; albumen copious, floury; embryo minute, at the base of and outside the albumen; cotyledon shield-shaped with an erect conical plumule and a descending conical radicle.—Distrib. Genera about 325; species more than 3000, in all parts of the world.

I have, at Dr. Stapf's suggestion, adopted for the two classes of glumes the terms *involucral* and *floral*. In the clavis I have closely adhered to the Tribes adopted by Dr. Stapf in his 'Flora Capensis' (1898).

In citing Trimen's 'Flora of Ceylon,' the Gramineæ of which have been entirely written by Sir J. D. Hooker, I have, for the sake of brevity, adopted the citation "*Trim. Fl. Ceyl.*" except in cases of descriptions of new species.

SERIES I. Mature spikelets articulate on their pedicels (sometimes inarticulate in *Isachne*) or deciduous with them; spikelets similar or differing in sex and structure, the perfect spikelets with 2 heteromorphous florets, the upper hermaphrodite, the lower male or neuter. Rhachilla not produced beyond the upper floret.

Tribe 1. **PANICEÆ.** Spikelets in usually continuous spikes, racemes, or panicles; lower invol.-glume smaller, often minute or suppressed;

lower floral glume generally resembling the invol.-glumes in structure and nervation; upper floral glume firmer, at length rigid, often chartaceous to crustaceous.

Shrubs; flowers diœcious ..... 1. SPINIFEX.
Herbs; flowers not diœcious.
Spikelets 2-flowered, the upper 2-sexual; lower male or neuter, rarely (*Isachne*) both fertile.
Mature spikelets persistent on their pedicels, surrounded singly or in clusters by an involucel of naked or plumose bristles or spines which fall along with the spikelets.
Involucel of bristles ..... 2. PENNISETUM.
Involucel of spines connate at the base ..... 3. CENCHRUS.
Mature spikelets falling entire and singly from the tips of their pedicels.
Spikelets subtended by an involucel of bristles ..... 4. SETARIA.
Spikelets not subtended by bristles.
Branches of the panicle produced beyond the uppermost spikelets; lower invol.-glume minute, orbicular, white, hyaline ..... 5. CHAMÆRAPHIS.
Branches of the panicle not produced beyond the uppermost spikelets.
Glumes 4, all distinct or 3 distinct and 1 obsolete (in *Panicum subeglume* sometimes 2 obsolete).
Invol.-glumes separately deciduous ..... 6. ISACHNE.
Invol.-glumes not separately deciduous.
Spikelets awned (except in *Tricholæna Teneriffæ*).
Spikelets densely silky..... 7. TRICHOLÆNA.
Spikelets not silky.
Palea of lower floral glume very short, 2-fid ..... 8. AXONOPUS.
Palea of lower floral glume entire or 0 ..... 9. OPLISMENUS.
Spikelets not awned except in *Panicum stagninum* (mucronate or apiculate in a few species of *Panicum* and in *Eriochloa*).
Lower invol.-glume distinct (except in *Panicum subeglume*); inflorescence paniculate ..... 10. PANICUM.
Lower invol.-glume minute (rarely absent); nerves of lower floral glume 5–7, straight, prominent; inflorescence usually digitate ... 11. DIGITARIA.
Lower invol.-glume absent; nerves of lower floral glume 5 or fewer, the side-nerves curved.
Spikelets not thickened at the base ..... 12. PASPALUM.
Spikelets thickened at base ... 13. ERIOCHLOA.

TRIBE 2. **ANDROPOGONEÆ.** Spikelets usually in pairs, one sessile, the other pedicellate, rarely 3-nate or solitary on the axis of a usually spike-like raceme. Invol.-glumes more or less rigid and firmer than the floral glumes, the lower always longer than the florets; floral glumes membranous, often hyaline, that of the upper floret usually awned or reduced to an awn.

Spikelets all similar.
- Spikelets solitary, secund on a filiform or flattened inarticulate rhachis ..... 14. DIMERIA.
- Spikelets in open or contracted panicles.
  - Racemes of spikelets in compound panicles.
    - Rhachis not fragile.
      - Panicle spiciform silky; spikelets 1-flowered ... 15. IMPERATA.
    - Rhachis fragile.
      - Leaves petiolate; spikelets 2-flowered ..... 16. SPODIOPOGON.
      - Leaves not petiolate; spikelets 1-flowered.
        - Panicle much branched, open, silky.
          - Spikelets awnless ..... 17. SACCHARUM.
          - Spikelets awned ..... 18. ERIANTHUS.
  - Racemes of spikelets 2-nate, digitate or approximate on a short main axis ..... 19. POLLINIA.

Spikelets dissimilar.
- Spikelets of each pair differing in sex and structure or (*Ophiurus*) spikelets solitary not secund.
  - Spikelets sunk in pits of an articulate or fragile rhachis.
    - Sessile spikelets unaccompanied by an upper spikelet or the pedicel of one ..... 20. OPHIURUS.
    - Sessile spikelets accompanied by a dissimilar pedicellate spikelet.
      - Lower invol.-glume ovate or oblong, flat, smooth ..... 21. ROTTBOELLIA.
      - Lower invol.-glume globose, inflated, pitted ... 22. MANISURIS.
  - Spikelets not sunk in nodes of the rhachis.
    - Spikelets 3 on a very short uninodal inarticulate rhachis, a sessile 2-flowered and 2 pedicellate enclosed in a pedunculate spathe ..... 23. APLUDA.
    - Spikelets many or few on a plurinodal inarticulate rhachis.
      - Spikelets many, 2-nate (rarely solitary), in spike-like racemes which are solitary, 2-nate, digitate or approximate on a short main axis; lower floret of the sessile spikelet male.
        - Margin of lower invol.-glume of sessile spikelet inflexed ..... 24. ISCHÆMUM.
        - Margin of lower invol.-glume of sessile spikelet not inflexed.
          - Spikelets 2-awned ..... 25. POGONATHERUM.
          - Spikelets 1-awned.
            - Pedicellate spikelets floriferous ..... 26. LOPHOPOGON.
            - Pedicellate spikelets reduced to pedicels often glume-like.
              - Spikelets 1–2-flowered; lower invol.-glume cuneate-obovate or obcordate, villous; lodicules 0. 27. APOCOPIS.
              - Spikelets 1-flowered; lower invol.-glume lanceolate, often muriculate; lodicules 2 ..... 28. ARTHRAXON.
              - Spikelets 2-flowered; lower invol.-glume ovate, beaked, transversely rugose; lodicules 2 ..... 29. THELEPOGON.
      - Spikelets in compound panicles or spike-like racemes, variously disposed, 2-nate (rarely 3-nate); lower floret of all the spikelets empty; upper usually awned or reduced to an awn.
        - Lower invol.-glume furnished with oil-glands or penicillate tubercles close to the keels; spikelets not awned but often beaked ..... 30. ELIONURUS.

Lower invol.-glume not furnished with oil-glands; spikelets awned.
Spikelets in alternate pairs or lower solitary.
Inflorescence usually elongate; sessile spikelets many ..... 31. ANDROPOGON.
Inflorescence very short; sessile spikelets 2 ..... 32. PSEUDANTHISTIRIA.
Spikelets dimorphic, the 4 lower sessile forming an involucre round the upper.
Rhachis articulate above the involucral spikelets ..... 33. THEMEDA.
Rhachis articulate below the involucral spikelets ..... 34. ISEILEMA.

TRIBE 3. **MAYDEÆ.** Inflorescence monœcious, spicate, the male and female spikelets on the same spike (in which case the females are at the base of the spike) or on different spikes; spikelets never awned, the male and female very dissimilar.

Fruiting spikelet enclosed in a stony polished nut-like bract ..... 35. COIX.
Fruiting spikelet with the lower invol.-glume forming a crustaceous nut-like envelope to the other glumes and grain ..... 36. POLYTOCA.

SERIES II. Mature spikelets breaking up, leaving the persistent or subpersistent glumes on the pedicel, or if falling entire, then not consisting of 2 heteromorphous florets as in Series I.

A. *Leaf-blades rarely* (Centotheca) *transversely veined, not articulate on the sheath.*

TRIBE 4. **ARUNDINELLEÆ.** Florets 2, heteromorphous, the lower awnless, male or neuter. Rhachilla not produced beyond the upper floret. Lower floral glume awnless, rather resembling the invol.-glumes; upper generally awned; awn from the sinus often between 2 bristle-like lateral awns (rarely from the entire obtuse tip), usually geniculate and twisted below the knee.

Spikelets solitary on distinct pedicels, small; flaps of the palea auricled ..... 37. ARUNDINELLA.
Spikelets in clusters of 3, large; flaps of the palea not auricled ..... 38. TRISTACHYA.

TRIBE 5. **ARUNDINEÆ.** Florets 2–many, enveloped in very long hairs springing either from the callus or from the back or margin of the floral glumes. Glumes membranous, often hyaline.

Hairs springing from the margins of the upper floral glume ..... 39. THYSANOLÆNA.
Hairs springing from the callus ..... 40. PHRAGMITES.

TRIBE 6. **STIPEÆ.** Floret 1. Rhachilla not produced beyond the upper floral glume which is 2-sexual, hardened when mature, tightly enveloping the fruit; nerves joining or closely approaching at the tip. Awn terminal (rarely 0).

Awns 3 from the entire tip or 1 simple below, 3-branched above, rarely quite simple ..... 41. ARISTIDA.

TRIBE 7. **AGROSTEÆ.** Floret 1. Rhachilla rarely produced beyond the floret. Upper floral glume membranous, not changed

when mature, usually 5-nerved, all the nerves or the outer side-nerves often slightly excurrent, parallel, or at least not anastomosing. Spikelets awned or not.

Spikelets in cylindric spike-like panicles; spikelets not awned ..... 42. HELEOCHLOA.
Spikelets in open or contracted many-flowered panicles; spikelets awned.
Spikelets subdigitately panicled at the top of a slender peduncle, laterally compressed; stamens 2 ..... 43. WOODROWIA.
Spikelets terete, in branched panicles; stamens 3 ..... 44. GARNOTIA.

TRIBE 8. **ZOYSIEÆ.** Mature spikelets falling entire and singly or in clusters. Floret 1. Rhachilla not produced beyond the floret. Glumes equal or the lower much smaller or suppressed. Floral glume small, thinly membranous, 1–3-nerved. Spikelets in slender spiciform panicles or racemes.

Spikelets falling in clusters of 2–4.
Spikelets fascicled.
Fascicles secund on a broad articulate rhachis; glumes 4; upper invol.-glume not echinate..... 45. TRACHYS.
Fascicles all round a slender rhachis; glumes 3; upper invol.-glume echinate ..... 46. TRAGUS.
Spikelets falling singly.
Lower invol.-glume with pectinate margins; upper invol.-glume spinulosely tuberculate; glumes 3 ..... 47. LATIPES.
Invol.-glumes neither pectinate nor tuberculate.
Glumes 2; spikelets not awned ..... 48. ZOYSIA.
Glumes 3; spikelets with a long awn ..... 49. PEROTIS.

TRIBE 9. **SPOROBOLEÆ.** Involucral and floral glumes very similar. Floret 1. Rhachilla not (or rarely) produced beyond the floret. Upper floral glume membranous, acute or obtuse, not changed when ripe, 1- or more or less distinctly 3-nerved, awnless, usually olive-green or grey; side-nerves, if present, delicate, evanescent above. Seed often free in the delicate pericarp.

Spikelets small ..... 50. SPOROBOLUS.

TRIBE 10. **ERAGROSTEÆ.** Spikelets variously panicled, sometimes spicate or subspicate. Florets usually numerous and far-exserted from the glumes. Involucral and floral glumes somewhat similar in general appearance. Floral glumes membranous or chartaceous, entire or 2–3-cleft, 3-nerved, the nerve evanescent above or excurrent into bristles; side-nerves usually submarginal, glabrous or pubescent or finely ciliate below. Paleæ often persistent or subpersistent.

Floral glumes entire.
Upper invol.-glume 3-nerved ..... 51. ERAGROSTIS.
Upper invol.-glume 5-nerved ..... 52. HALOTYRUM.
Floral glumes toothed..... 53. DIPLACHNE.

TRIBE 11. **CHLORIDEÆ.** Spikelets usually in 2-ranked secund spikes or spike-like racemes, rarely distinctly pedicellate and paniculate. Florets 1 to many. Floral glumes usually membranous, truncate, emarginate or toothed, 3-nerved; nerves distant, subparallel, distinct, percurrent or excurrent, and often ciliate all along, the lateral submarginal (in *Eleusine* there are sometimes additional side-nerves close to the middle nerve of the glume). Awn, if present, straight, usually from a truncate or toothed tip.

Spikelets in deciduous articulate clusters ..... 54. GRACILEA.
Spikelets not clustered.
Spikelets 1-flowered or with one hermaphrodite and 1 or more male or barren florets.
Spikelets 1-flowered, awnless.
Spike solitary, terminal; invol.-glumes longer than the ciliate membranous floral glume ..... 55. MICROCHLOA.
Spikes digitate; invol.-glumes shorter than the glabrous subchartaceous floral glume ..... 56. CYNODON.
Spikelets with 1 hermaphrodite flower, the others male or barren, usually awned, in digitate or fascicled spikes ..... 57. CHLORIS.
Hermaphrodite florets 2–many in each spikelet (sometimes reduced to 1 in *Tripogon pauperculus*).
Spikelets crowded on a solitary spike ..... 58. TRIPOGON.
Spikes digitate or whorled ..... 59. ELEUSINE.
Spikes in narrow pyramidal racemes ..... 60. DINEBRA.

TRIBE 12. **PAPPOPHOREÆ.** Floral glumes broad, 5–many-nerved, cleft into 3–many subulate lobes with or without alternating fine straight awns from the sinuses.

Floral glumes 9-cleft ..... 61. ENNEAPOGON.

TRIBE 13. **ORYZEÆ.** Spikelets all alike or more or less heteromorphous and unisexual. Fertile floret 1, awned or not, terminal with 2 minute empty florets (floral glumes) below it or solitary. Invol.-glumes very minute or confluent into an annular rim or suppressed. Palea 3–9-nerved. Stamens usually 6 (rarely more), or 1–3.

A floating glabrous grass; spikelets awned ..... 62. HYGRORHIZA.
Leafy tall grasses, not floating; spikelets usually awnless.
Keels of floral glume and palea pectinately ciliate; spikelets awnless ..... 63. LEERSIA.
Keels of floral glume and palea not pectinately ciliate; spikelets rarely awned ..... 64. ORYZA.

TRIBE 14. **FESTUCEÆ.** Involucral glumes more or less resembling the floral ones in general appearance. Fruiting florets 2 to many (very rarely 1), often much exserted from the glumes. Floral glumes 5- or more-nerved (rarely 1–3-nerved). Awns, if present, terminal or subterminal, never geniculate.

Leaves broad, tessellately nerved; fruiting glumes with reflexed submarginal tubercle-based bristles ..... 65. CENTOTHECA.
Leaves narrow, not tessellately nerved; fruiting glumes without submarginal bristles.
Leaves reaching 12 in. long or more, flaccid; inflorescence in long, often interrupted cylindric spikes ..... 66. ELYTROPHORUS.
Leaves less than 2 in. long, rigid, pungent; inflorescence in short subcapitate spikes ..... 67. ÆLUROPUS.

TRIBE 15. **HORDEÆ.** Spikelets sessile, singly or in clusters, more or less sunk in the hollows of the rhachis of a simple spike. Florets 1 or more.

Spikelets solitary at the nodes of the spike with their plane radial to the rhachis. Florets 1–3 ..... 68. OROPETHUM.

B. *Blades of leaves transversely veined and articulate on the sheath.*

TRIBE 16. **BAMBUSEÆ.** Shrubs or trees. Spikelets all of one kind. Florets few to many (rarely 1). Lower 2 or more glumes empty, gradually increasing in size up to the flowering, with sometimes

small terminal imperfect ones. Floral glumes subherbaceous to subcoriaceous, 5–many-nerved, usually awnless. Lodicules usually 3. Stamens 3–6 or more. Styles 2 or 3.

Pericarp thin, adnate to the seed.
- Paleæ all 2-keeled; stamens 6; filaments free ..... 69. BAMBUSA.
- Paleæ of upper flowers 0 or glume-like, not keeled; filaments connate ..... 70. OXYTENANTHERA.

Pericarp fleshy or crustaceous, not adnate to the seed.
- Spikelets 2–many-flowered; palea 2-keeled; stamens 6; pericarp crustaceous ..... 71. DENDROCALAMUS.
- Spikelets 1-flowered; palea 0 or glume-like; pericarp fleshy ..... 72. OCHLANDRA.

1. **SPINIFEX,** Linn.

Dicœcious gregarious much-branched rigid littoral bushes; stem and branches woody. Leaves narrow, rigid, involute, spreading and recurved, thickly coriaceous. Inflorescence of large terminal globose bracteate heads, with radiating spike-like racemes, the male with many spikelets on each spike, the female with one only. MALE SPIKELETS 1–2-flowered, distichous, articulate on short pedicels. Glumes 4, chartaceous, acute, strongly nerved; invol.-glumes empty; lower floral glume paleate, empty or 3-androus; upper floral glume paleate, 3-androus, the paleæ of both floral glumes acuminate, as long as the glumes. Anthers linear. FEMALE SPIKELETS narrower than the male, erect, lanceolate, 1-flowered. Glumes acute or acuminate, strongly nerved, the lower invol.-glume the longest; lower floral glume empty; upper floral glume thin, dorsally compressed; palea linear-oblong, acuminate. Lodicules 2, large, connate below, strongly nerved. Styles long, connate below; stigmas long, penicillate, exserted at the top of the glume. Grain clavate, tipped by the long rigid style, free within the hardened glume and palea.—DISTRIB. Species 4, one in India, three in Australia.

1. **Spinifex squarrosus,** *Linn. Mant.* (1771) p. 300. A pale grey or glaucous squarrose shrub, several feet high and broad, forming an impenetrable thicket; stem as thick as the little finger below, smooth, solid. Leaves 4–6 in. long, spreading and recurved, smooth, tapering from the base to the tip, concavo-convex, base not dilated, margins scaberulous; sheath ½–1 in. long, smooth, with naked margins; ligule a ridge of stiff hairs. MALE INFLORESCENCE reaching 6–8 in. in diam.; bracts shorter than the spikes, lanceolate, aristately pungent, flat, chartaceous, the midrib very prominent beneath; racemes (male) 1–3 in. long, longer than the stout angular peduncles; rhachis angular. Spikelets ½ in. long, smooth, straw-colored. Glumes 4; lower invol.-glume usually shorter than the upper, ovate, acute, pungent, conspicuously 7–9-nerved; upper invol.-glume similar but usually longer; floral glumes longer than the invol.-glumes, subequal, 5–7-nerved. FEMALE INFLORESCENCE reaching 10 in. in diam.; bracts as in the male but smaller; peduncle thickened towards the base. Spikelets ½–⅔ in. long, narrowly lanceolate. Glumes 4; lower invol.-glume oblong-lanceolate, many-nerved, scaberulous; upper invol.-glume rather shorter, 7-nerved; lower floral glume empty, the palea 0 or imperfect; upper floral glume ovate-lanceolate, 5-nerved; palea shorter than the glume,

acute. Fl. B. I. v. 7, p. 63; Grah. Cat. p. 240; Trim. Fl. Ceyl. v. 5, p. 174; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1168; Watt, Dict. Econ. Prod. v. 6, part 3, p. 331.—Flowers: Nov. A valuable sand-binding plant.

KONKAN: *Law*!; Shrivardhan, *Woodrow*; sandy shores near Bandra, close to Bombay, *Graham*. KANARA: *Thomson*!; Kumpta, *Woodrow*. GUJARAT: near Domas, *Cooke*!—DISTRIB. Sandy shores of India; Ceylon, Java, China.

2. **PENNISETUM,** Pers.

Annual or perennial grasses. Leaves narrow. Inflorescence of spike-like racemes of involucellate clusters of shortly pedicellate spikelets articulate on a simple rhachis; involucels consisting of unequal scabrid or plumose simple or branched bristles. Spikelets 1–6 in each involucel, persistent on their pedicels, 1–2-flowered, obovoid or lanceolate. Glumes 3 or 4; lower invol.-glume small or 0; upper invol.-glume subequal to the lower floral glume, 5–7-nerved, awned or not, rarely absent; lower floral glume paleate or not, male or empty; upper floral glume sessile, coriaceous, 2-sexual or female. Lodicules 2. Stamens 3; anthers linear. Styles long, free or connate below. Grain oblong, free within the hardened glume and palea.—DISTRIB. Species about 40, in most warm countries.

Bristles of involucel free to the base, slender, not dilated at the base.	
Inner bristles of involucel scaberulous, not ciliate.	
Leaves 12–18 in. long	1. *P. Alopecuros.*
Leaves 3–6 in. long	2. *P. dichotomum.*
Inner bristles of involucel ciliate below the middle with long hairs, but naked at the base; involucel stipitate	3. *P. orientale.*
Inner bristles of involucel densely villous or ciliate below the middle, not naked at the base; involucel sessile.	
Inner bristles of involucel densely villous	4. *P. pedicellatum.*
Inner bristles of involucel laxly ciliate with long silky hairs (not villous)	5. *P. setosum.*
Inner bristles of involucel dilated below, their bases confluent in a coriaceous disk	6. *P. cenchroides.*

1. **Pennisetum Alopecuros,** *Nees, ex Steud. Syn. Gram.* (1855) p. 102. Perennial; stems 2–3 ft. high, stout, erect, densely tufted below, subdistichously branched above; branches strict, erect. Leaves 12–18 by $\frac{1}{10}$–$\frac{1}{8}$ in., coriaceous, convolute, glabrous, with usually a tuft of soft hairs at the base; sheaths glabrous or nearly so; ligule a small hairy ring. Racemes spike-like, 5–7 in. long; rhachis flexuous, scaberulous, angular; involucel very shortly pedicellate; bristles very unequal, the longest 2–3 times as long as the spikelet, scaberulous. Spikelets reaching nearly $\frac{3}{8}$ in. long, lanceolate, acute, solitary. Glumes 4; lower invol.-glume $\frac{1}{20}$ in. long, suborbicular, hyaline; upper invol.-glume $\frac{1}{6}$ in. long, lanceolate, acuminate, 3-nerved, hyaline; lower floral glume $\frac{1}{3}$ in. long, lanceolate, acuminate, 7–11-nerved with involute margins; upper floral glume slightly longer than the lower one, lanceolate, acuminate, 5-nerved, with involute margins, 2-sexual; palea lanceolate, as long as the glume. Fl. B. I. v. 7, p. 84; Woodr. in Journ. Bomb. Nat. v 13 (1901) p. 435; Watt, Dict. Econ. Prod. v. 6, part 1, p. 127. *Pennisetum aureum,* Dalz. & Gibs. Bo. Fl. (1861) p. 294.—Flowers: Oct. ◦ VERN. *Mohl.*

DECCAN: common, *Dalzell & Gibson*; Poona, *Jacquemont*, 407!, *Woodrow*, *Lisboa*; Lanoli, *Lisboa*; Nasik, *Lisboa*. S. M. COUNTRY: Belgaum, *Woodrow*. • SIND: *Dalzell*! —DISTRIB. India (W. Peninsula, Rajputana, Central India). The leaves are used on Mount Abu for making ropes.

2. **Pennisetum dichotomum,** *Delile*, *Fl. d'Egypte*, p. 159, t. 8, fig. 1. Perennial, quite glabrous, bushy; stem distantly dichotomously branched, the branches often fascicled; internodes long, rigid, smooth and polished. Leaves 3–6 by $\frac{1}{16}$–$\frac{1}{8}$ in., narrowly linear, tapering to a subulate point, rigid. Racemes 2½–5 in. long, cylindric, pale (nearly white); rhachis more or less scaberulous, angular; involucel sessile or nearly so; bristles very numerous, slender, pale, unequal, the longer twice as long as the spikelet, free to the base. Spikelets usually solitary, ⅛ in. long, lanceolate, acuminate, nearly white. Glumes 4; lower invol.-glume nearly ¼ in. long by $\frac{1}{16}$ in. broad at the base, lanceolate, acuminate, 1-nerved, hyaline; upper invol.-glume ⅛ in. long, lanceolate, acuminate, 5–7-nerved, hyaline; lower floral glume as long as the upper invol.-glume, ovate-lanceolate, cuspidately acuminate, paleate, 5-nerved, the palea nearly as long as the glume, lanceolate, acute; upper floral glume as long as the lower one, ovate-lanceolate, acuminate, cuspidate, 5-nerved; palea ¼ in. long, lanceolate, acuminate. Styles much exserted beyond the spikelets, free nearly to the base, densely plumose in the upper part. Fl. B. I. v. 7, p. 85; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435. *Cenchrus ramosissimus*, Poir. Encyc. Méthod. v. 6 (1804) p. 51; Dalz. & Gibs. p. 294.—Flowers: Nov.–Dec.

GUJARAT: in hedges, *Dalzell & Gibson*. SIND: on sand hills, *Stocks*!, *Woodrow*; Hyderabad, *Cooke*!—DISTRIB. India (Panjáb, N.W. Provinces, W. Peninsula); Afghanistan and westwards to N. Africa.

3. **Pennisetum orientale,** *Rich. in Pers. Syn.* v. 1 (1805) p. 72. Perennial, 2–4 ft. high; stem suberect from a stout rootstock, leafy, clothed below with withered sheaths. Leaves 6–12 by ⅛–⅜ in., narrowly linear, finely acuminate, flat, smooth, the margins scaberulous ciliate close to the obtuse or truncate base; sheaths glabrous with ciliate margins; ligule a shortly ciliate line. Racemes reaching as much as 10 in. long; rhachis subterete, pubescent; involucel shortly stipitate, the stipe pubescent; bristles very unequal, the longest about ¾ in. long (rarely one may be found 1 in. long), often purplish, scaberulous, the inner ciliate with long hairs below the middle, but naked at the base. Spikelets usually 2–6 (rarely solitary) within the involucel, reaching ¼ in. long, on pubescent pedicels. Glumes 4; lower invol.-glume $\frac{1}{16}$–$\frac{1}{12}$ in. long, ovate-oblong, obtuse, nerveless, hyaline; upper invol.-glume ⅛ in. long, ovate-lanceolate, acuminate; lower floral glume ¼ in. long, ovate-lanceolate, 5-nerved, awned, triandrous, the palea ⅛ in. long, oblong, obtuse, often 2-fid, hyaline; upper floral glume ⅛ in. long, membranous, ovate-lanceolate, 5-nerved, awned; palea ⅛ in. long, lanceolate, acuminate, with involute margins, sometimes biaristulate at the tip. Fl. B. I. v. 7, p. 86; Trim. Fl. Ceyl. v. 5, p. 171; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1169.—Flowers: July.

KONKAN: *Stocks*!—DISTRIB. India (W. Himalaya, Panjáb, W. Peninsula); N. Africa.

4. **Pennisetum pedicellatum,** *Trin. in Mém. Acad. Pétersb.* sér. 6, v. 3, part 2 (1835) p. 184. Annual; stems 1–3 ft. long, branched from the base and above, leafy. Leaves 6–10 by $\frac{1}{6}$–$\frac{3}{8}$ in., flat, flaccid, glabrous or sparsely hairy; sheaths glabrous; ligule a shortly ciliate membrane. Racemes cylindric, 2–5 in. long, dense-flowered; rhachis glabrous or nearly so, notched; involucel sessile; outer bristles few, slender, short, about $\frac{1}{8}$ in. long; inner bristles numerous, the longest reaching $\frac{3}{8}$ in. long (or more), densely villous below the middle, unequal, usually pale, free to the base. Spikelets $\frac{1}{6}$ in. long, usually solitary within the involucel, shortly pedicellate. Glumes 4; lower invol.-glume very small, woolly; upper invol.-glume oblong-lanceolate, apiculate, $\frac{1}{6}$ in. long, 7-nerved, hyaline; lower floral glume $\frac{1}{8}$ in. long, oblong, truncate, 3-toothed, 5-nerved, hyaline; upper floral glume ovate-oblong, obtuse, with a fimbriately ciliate tip, rather shorter than the lower floral glume, coriaceous, smooth, shining; palea as long as the glume, lanceolate, toothed. Fl. B. I. v. 7, p. 86; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1169. *Pennisetum lanuginosum*, Hochst. in Flora, v. 25, part 1 (1842), Beibl. i. p. 133; Lisboa, in Journ. Bomb. Nat. v. 5 (1891) p. 339.—Flowers: Oct.

Deccan: *Lisboa.* Gujarat: *Lisboa*; Rajkot (Kathiawar), *Woodrow.*—Distrib. India (Behar, Rajputana, W. Peninsula); Tropical Africa.

5. **Pennisetum setosum,** *Rich. in Pers. Syn.* v. 1 (1805) p. 72 (*exclud. syn.*). Annual; stem erect, often fastigiately branched at the nodes, green or purplish. Leaves 6–10 by $\frac{1}{4}$–$\frac{3}{8}$ in., linear, finely acuminate, glabrous or hairy; sheaths glabrous; ligule a line fringed with rather long soft hairs. Racemes 2–4 in. long, usually purplish-brown; rhachis glabrous, notched; involucel sessile; bristles unequal, the outer not ciliate, short, about $\frac{1}{8}$ in. long, the inner longer, ciliate below the middle with long silky hairs (1 of the inner bristles is often much longer than the others, reaching $\frac{1}{2}$ in., the others $\frac{1}{4}$–$\frac{1}{3}$ in. long). Spikelets $\frac{1}{6}$ in. long, solitary within the involucel. Glumes 3 or 4; lower invol.-glume minute or wanting; upper invol.-glume $\frac{1}{6}$ in. long, ovate-oblong, gradually or suddenly cuspidate, 5-nerved, hyaline; lower floral glume $\frac{1}{8}$ in. long, oblong, obtuse, with 2 subobtuse lateral and an acute median tooth at the apex, 5-nerved, paleate, male, the palea $\frac{1}{10}$ in. long, narrowly oblong, hyaline; upper floral glume $\frac{1}{10}$ in. long, ovate-oblong, truncate, fimbriately ciliate at the tip, coriaceous, smooth and shining; palea as long as the glume, oblong, truncate, toothed or ciliate at the tip. Anthers nearly $\frac{1}{12}$ in. long. Styles long, reaching $\frac{1}{8}$ in., much exserted beyond the spikelet. Fl. B. I. v. 6, p. 87; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1169.—Flowers: Dec.

Sind: Hyderabad, *Woodrow.*—Distrib. India (Behar, W. Bengal, Upper Gangetic plain, W. Peninsula); Tropical Africa and America.

6. **Pennisetum cenchroides,** *Rich. in Pers. Syn.* v. 1 (1805) p. 72. Perennial; stems tufted, 6–18 in. long, erect, or decumbent and much-branched from the base, stout or slender, leafy, or ascending from a branched often nodose rootstock. Leaves 4–10 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear, tapering to a fine point, glabrous or hairy. Racemes cylindric, dense, 1–4 by $\frac{1}{3}$–$\frac{1}{2}$ in., pale or purplish; rhachis finely scaberulous; involucels

subsessile; outer bristles slender, short, not ciliate; inner bristles about $\frac{3}{8}$ in. long (1 bristle conspicuously longer and stouter than the others, reaching $\frac{1}{2}$ in. long or more), dilated and connate into a ring at the base. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. long, oblong-lanceolate, 3–1 in each involucel. Glumes 4; lower invol.-glume $\frac{1}{10}$ in. long, ovate-lanceolate, acute, faintly 1-nerved, hyaline; upper invol.-glume $\frac{1}{8}$ in. long, ovate, acuminate, 1-nerved, hyaline; lower floral glume $\frac{1}{6}$–$\frac{1}{5}$ in. long, ovate-lanceolate, cuspidately acuminate, 3–5-nerved, paleate, usually male, the palea narrowly lanceolate, as long as the glume; upper floral glume as long as the lower one, lanceolate, 3–5-nerved; palea lanceolate, as long as the glume. Fl. B. I. v. 7, p. 88; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Watt, Dict. Econ. Prod. v. 6, part 1, p. 127.—Flowers: Dec.

DECCAN: *Lisboa*. GUJARAT: *Lisboa*; Rajkot (Kathiawar), *Woodrow*. SIND: Jemadar ka Landa, near Karachi, *Stocks*!—DISTRIB. India (Kashmir, Upper Gangetic plain, W. Peninsula); Sicily, Tropical Africa, and the Canaries.

Pennisetum Typhoideum, Rich. in Pers. Syn. v. 1 (1805) p. 72. An annual plant widely cultivated in India, probably a native of Africa, growing to a height of 5 or 6 ft. with racemes sometimes reaching a foot long.

In the Bombay Presidency more than four millions of acres are annually grown, and in many parts it forms the staple food of the people. It is so well known by its native name *Bajri* that description is unnecessary. Fl. B. I. v. 7, p. 82; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1169; Watt, Dict. Econ. Prod. v. 6, part 1, p. 127. *Holcus spicatus*, Linn. Syst. ed. 10, p. 1305; Grah. Cat. p. 238; Dalz. & Gibs. Suppl. p. 99.

3. **CENCHRUS,** Linn.

Characters of *Pennisetum*, but involucels composed of subulate hard spines without filiform tips, connate below into a short coriaceous cup which is surrounded by erect or squarrose bristles.—DISTRIB. Species few, tropical and subtropical.

Base of involucel rounded; inner bristles up to $\frac{1}{8}$ in. long, erect, not ciliate	1. *C. biflorus*.
Base of involucel turbinate; inner bristles up to $\frac{3}{8}$ in. long, usually squarrosely spreading, ciliate at the base	2. *C. catharticus*.

1. **Cenchrus biflorus,** *Roxb. Fl. Ind.* v. 1 (1832) p. 233. Annual?; stem 6–24 in. long, simple. Leaves 3–10 by $\frac{1}{8}$–$\frac{3}{8}$ in., linear-lanceolate, finely acuminate, glabrous or hairy; sheaths glabrous or nearly so, ciliate near the mouth; ligule a pubescent ring. Racemes 2–4 in. long, solitary, cylindric; rhachis angular, smooth; involucel usually 2-flowered, rounded at the base; bristles thick, lanceolate-subulate, erect, dorsally flattened, the outer very short, about $\frac{1}{16}$–$\frac{1}{10}$ in. long, glabrous, the inner $\frac{1}{8}$ in. long, glabrous or puberulous. Spikelets $\frac{1}{6}$ in. long, subglobose. Glumes 4; lower invol.-glume $\frac{1}{10}$ in. long, ovate, acuminate, very thin, hyaline, 1 (rarely 3)-nerved; upper invol.-glume $\frac{1}{6}$ in. long, ovate, apiculate, 5-nerved, hyaline; lower floral glume scarcely shorter than the upper invol.-glume, ovate, acute, 5–7-nerved, paleate, the

palea $\frac{1}{8}$ in. long, oblong, obtuse; upper floral glume as long as the lower, ovate, obtuse. Anthers $\frac{1}{10}$–$\frac{1}{8}$ in. long. Styles free almost to the base. Grain $\frac{1}{12}$ by $\frac{1}{16}$ in., orbicular-oblong, compressed, smooth, shining, pale brown. Fl. B. I. v. 7, p. 89; Grah. Cat. p. 234; Dalz. & Gibs. p. 294; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435.

GUJARAT: Ahmedabad, *Cooke*!; Morvi (Kathiawar), *Beck* ex *Woodrow*. SIND Karachi, *Woodrow*; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (Panjáb, Rajputana, W. Peninsula); Beluchistan, Arabia, Africa.

2. **Cenchrus catharticus,** *Delile, Cat. Hort. Monsp.* (1838); *Linnæa*, v. 13 (1839), *Litt.* p. 103. Quite glabrous; stems tufted, geniculately ascending, branched from the base, leafy. Leaves 1–5 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear-lanceolate, finely acuminate; sheaths glabrous; ligule a hairy ring. Racemes 1–6 in. long, usually more or less enclosed in the uppermost leaf-sheaths; rhachis angular, glabrous, flexuous; involucels with a turbinate base; bristles hard, subulate, sharply pungent, the outermost short, glabrous or nearly so, spreading or reflexed, the inner ciliate at the base, subulate, suberect or squarrosely spreading, dorsally grooved, reaching $\frac{3}{8}$ in. long. Spikelets shorter than the inner bristles. Glumes 4; lower invol.-glume ovate-lanceolate, acute, hyaline, $\frac{1}{12}$ in. long; upper invol.-glume rather more than $\frac{1}{6}$ in. long, 5-nerved, hyaline; lower floral glume ovate, acuminate, as long as the upper invol.-glume, 5-nerved, paleate, hyaline, the palea $\frac{1}{8}$ in. long, narrowly lanceolate, acute, hyaline; upper floral glume as long as the lower one, cuspidately acuminate, 5-nerved, membranous; palea ovate, acuminate, membranous, as long as the glume. Grain $\frac{1}{10}$ in. long, ovoid-oblong, compressed, pale, rugulose. Fl. B. I. v. 7, p. 90; Watt, Dict. Econ. Prod. v. 2, p. 246.

GUJARAT: Perim Island, at the mouth of the Narbada river, *Raoji*!—DISTRIB. India (Panjáb, W. Peninsula); Arabia, Tropical Africa.

4. SETARIA, Beauv.

Annual (rarely perennial) grasses of various habit; nodes of stem glabrous or hairy; ligules a ridge of hairs. Spikelets subsessile in contracted, cylindric or pyramidal terminal panicles, articulate on a very short pedicel, subtended by 1 to many persistent scabrid or barbed bristles (modified branchlets) which often form a one-sided involucel, but are sometimes present and absent in the same inflorescence. Glumes 4; lower invol.-glume usually much the smallest, 3–5-nerved, membranous; upper invol.-glume 5–7-nerved; lower floral glume more or less exceeding and resembling the upper invol.-glume, usually paleate; upper floral glume coriaceous or crustaceous, 5-nerved, paleate, the palea about equalling the glume. Lodicules 2, broadly cuneate. Stamens 3. Styles distinct; stigmas laterally exserted. Grain tightly enclosed by the hardened glume and palea, oblong or ellipsoid.—DISTRIB. Tropical and temperate; species about 40.

Leaves plicate.
- Perennial; stems reaching 8 ft. long; leaves up to 24 in. long; panicle 1-2 ft. long, with a scabrid rhachis ..... 1. *S. plicata.*
- Annual; stem reaching 2 ft. high; leaves up to 8 in. long; panicle 2–6 in. long, with a hairy rhachis ..... 2. *S. rhachitricha.*

Leaves flat not plicate.
- Bristles of involucel with spreading or erect teeth.
  - Inflorescence a cylindric spike-like raceme; bristles of involucel 6–12; spikelets $\frac{1}{8}$ in. long ..... 3. *S. glauca.*

Inflorescence a narrowly pyramidal panicle; bristles of involucel 3–6; spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long	4. *S. intermedia.*
Bristles of involucel with deflexed teeth	5. *S. verticiliata.*

1. **Setaria plicata,** *T. Cooke.* Perennial; stem 1–8 ft. long, erect or ascending from a woody branching rootstock, stout, leafy; nodes strigillose; internodes 2–6 in. long. Leaves 6–24 by $\frac{1}{2}$–3 in., linear-lanceolate, finely acuminate, chartaceous, glabrous or sparsely hairy, plicate between the numerous veins, base narrow; sheaths smooth or hispid, the margins naked, or ciliate near the top only; ligule of long hairs. Panicle 1–2 ft. long, contracted, nodding; rhachis stout, angular, scabrid; branches usually alternate, distant (the lower 3–4 in. long), filiform, suberect, bearing short capillary few-flowered branchlets and bristle-like flowerless ones. Spikelets $\frac{1}{8}$ in. long, sessile or shortly pedicellate, ovoid, acute or apiculate, glabrous. Glumes 4; lower invol.-glume broadly ovate, obtuse, 5-nerved, membranous, $\frac{1}{2}$ as long as the spikelet; upper invol.-glume rather more than $\frac{1}{2}$ as long as the upper floral glume, ovate, obtuse, 7-nerved, membranous; lower floral glume slightly longer than the upper, ovate, shortly apiculate, membranous, empty, paleate or not, 5-nerved, the palea when present small, hyaline, narrowly ovate, acute; upper floral glume crustaceous, ovate-oblong, acute or shortly apiculate, slightly transversely striate, pale-yellow, with strongly involute margins; palea ovate, acute, nearly as long as the glume, faintly transversely striate and with incurved membranous margins. *Panicum plicatum,* Lam. Illustr. v. 1 (1791) p. 171; Hook. f. Fl. B. I. v. 7, p. 55; Trim. Fl. Ceyl. v. 5, p. 157; Jacq. Eclog. Gram. v. 1, t. 1; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1176. *P. nepalense,* Spreng. Syst. v. 1 (1825) p. 321; Dalz. & Gibs. p. 291.—Flowers: Nov.

KONKAN: western side of the Ghâts, *Dalzell & Gibson*; Parel (Bombay), *Lisboa.* Sometimes cultivated as an ornamental grass in gardens.—DISTRIB. Throughout the moister hilly parts of India; Ceylon, Malay Peninsula, China, Malay Islands.

2. **Setaria rhachitricha,** *T. Cooke.* Annual; stems tufted, erect, 8–24 in. long, glabrous; nodes softly pubescent. Leaves 3–8 by $\frac{1}{2}$–1 in., oblong-lanceolate, tapering to both ends, finely acuminate, flaccid, glabrous or sparsely hairy, many-veined, plicate between the veins; sheaths with ciliate margins; ligule a tuft of hairs. Panicle 2–6 in. long, pyramidal; rhachis of panicle angular, hairy; branches 1–1½ in. long, alternate, spreading, with bristle-like flowerless scabrid branchlets at the base of the spikelets, much longer than the spikelets, 1 (rarely 2) to each pedicel; rhachis of branches angular, sparsely hairy. Spikelets numerous, glabrous, $\frac{1}{10}$ in. long, densely or loosely imbricate, ovate, subacute, dorsally compressed, pale with green nerves, articulated on short scaberulous pedicels. Glumes 4; lower invol.-glume orbicular-oblong, $\frac{1}{25}$ in. long, hyaline, obscurely nerved or nerveless; upper invol.-glume $\frac{1}{10}$ in. long, broadly ovate, subobtuse, 5-nerved, thinly membranous; lower floral glume about equal to the upper invol.-glume, similar, 5-nerved, epaleate; upper floral glume elliptic-oblong, subacute, coriaceous, white, transversely striate, $\frac{1}{10}$ in. long, with strongly involute margins; palea as long as the glume, elliptic, with involute membranous margins. *Panicum rhachitrichum,* Hochst. in Flora, v. 27 (1844) p. 254;

Hook. f. Fl. B. I. v. 7, p. 56; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1176.—Flowers: Oct.

S. M. Country: Londa, *Gammie* ex *Woodrow*.—Distrib. India (Subtropical Himalaya, W. Peninsula); Tropical Africa.

I have not seen any specimens from the Bombay Presidency; there are none in Herb. Kew.

3. **Setaria glauca,** *Beauv. Agrost.* (1812) p. 51. Stem 1–2 ft. high, erect or ascending, simple or branched; nodes glabrous, the lower rooting. Leaves 4–12 by $\frac{2}{3}$ in., linear, finely acuminate, flat, glabrous or sparsely hairy, with scabrid margins, base usually rounded; sheaths smooth; ligule a ridge of hairs. Inflorescence a cylindric densely flowered spike-like raceme 1–5 in. long; bristles of involucel 6–12, pale or reddish-brown, $\frac{1}{6}$–$\frac{1}{3}$ in. long, with very short erect or spreading teeth. Spikelets numerous, closely set along the rhachis of the spike, $\frac{1}{8}$ in. long, ellipsoid, glabrous. Glumes 4; lower invol.-glume less than $\frac{1}{2}$ as long as the spikelet, broadly ovate, often shortly apiculate, 3-nerved, hyaline; upper invol.-glume slightly longer than the lower, broadly ovate or suborbicular, hyaline, 5-nerved; lower floral glume thinly membranous, as long as the upper one, 5-nerved, paleate, empty or male, the palea hyaline; upper floral glume coriaceous, broadly elliptic, obtuse, dorsally convex, transversely rugose, pale. Fl. B. I. v. 7, p. 78; Dalz. & Gibs. p. 293; Trim. Fl. Ceyl. v. 5, p. 162; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1170; Watt, Dict. Econ. Prod. v. 6, part 2, p. 546.—Flowers: Oct. Vern. *Kolára.*

Konkan: *Stocks*!; Thána, *Lisboa.* Deccan: Mahableshwar common, *Dalzell & Gibson, Woodrow, Cooke*!; Nasik, *Lisboa.* Gujarat: Baroda, *Cooke*!—Distrib. More or less throughout India; Ceylon, most warm temperate and tropical regions.

4. **Setaria intermedia,** *Roem. & Schult. Syst.* v. 2 (1817) p. 489. Stem 2–3 ft. long, slender, erect or ascending; nodes glabrous, the lower often rooting. Leaves 2–9 by $\frac{1}{8}$–$\frac{3}{4}$ in., linear-lanceolate, finely acuminate, thin, flat, sparsely hairy on both surfaces, with scaberulous margins, base narrow; sheaths long, smooth, the mouth villous, the margins ciliate especially in the upper part. Panicle 4–6 in. long, narrowly pyramidal; rhachis glabrous, grooved; branches short, distant below, rather crowded above, dense-flowered; bristles of involucel 3–6, about $\frac{1}{4}$ in. long, very slender, flexuous, studded with minute erect teeth, pale. Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long, ovoid, subacute. Glumes 4; lower invol.-glume orbicular-oblong or ovate, about $\frac{1}{3}$ as long as the spikelet, hyaline, faintly 3-nerved; upper invol.-glume about $\frac{1}{2}$ as long as the spikelet, broadly ovate, subacute, hyaline, 5-nerved; lower floral glume about equalling the upper, broadly ovate, thinly membranous, 5-nerved, paleate, empty, the palea hyaline; upper floral glume broadly ovate or suborbicular, acute, coriaceous, very concave, transversely rugulose all over, yellowish-brown; palea elliptic, subacute. Fl. B. I. v. 7, p. 79; Trim. Fl. Ceyl. v. 5, p. 163; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1170; Watt, Dict. Econ. Prod. v. 6, part 2, p. 546.—Flowers: Aug.–Oct. Vern. *Pandar.*

Tolerably common throughout the Presidency. Konkan: *Law* ex *Woodrow.* Deccan: in cultivated fields about Poona, *Jacquemont, 355!* S. M. Country: Belgaum, *Ritchie,* 839!—Distrib. Throughout India; Ceylon, temperate and tropical regions.

5. **Setaria verticillata,** *Beauv. Agrost.* (1812) p. 51. Annual; stems erect or ascending, 1–3 ft. long, stout or slender, leafy, more or less branched, glabrous. Leaves 3–10 by $\frac{1}{6}$–$\frac{3}{4}$ in., thin, flat, glabrous or sparsely hairy and scaberulous, linear or linear-lanceolate, tapering to a fine point, base usually narrow; sheaths smooth, striate; ligule a fringe of hairs. Panicle 1–5 in. long, erect or curved, spike-like, cylindric or oblong, coarsely bristly; bristles of the involucel 1 or few, $\frac{1}{6}$–$\frac{1}{3}$ in. long, closely studded with conspicuous downward-pointing teeth. Spikelets $\frac{1}{12}$ in. long, ellipsoid, obtuse, glabrous. Glumes 4; lower invol.-glume $\frac{1}{30}$ in. long, ovate, acute, hyaline, faintly 3-nerved; upper invol.-glume about as long as the spikelet, ovate, subacute, thinly membranous, 5-nerved; lower floral glume similar to the upper invol.-glume, 5-nerved, empty, paleate or not, the palea when present hyaline, very small; upper floral glume elliptic-oblong, plano-convex, subobtuse, coriaceous, straw-colored, faintly striatulate and with incurved margins; palea as long as the glume, coriaceous, elliptic, faintly striatulate. Fl. B. I. v. 7, p. 80; Dalz. & Gibs. p. 294; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Trim. Fl. Ceyl. v. 5, p. 163; Prain, Beng. Pl. p. 1170; Watt, Dict. Econ. Prod. v. 6, part 2, p. 549.—Flowers: Dec. VERN. *Dangani.*

KONKAN: *Stocks!* GUJARAT: Baroda, *Woodrow*; Morvi (Kathiawar), *Woodrow.* SIND: *Stocks,* 649!—DISTRIB. Throughout India; Ceylon, temperate and tropical regions.

Setaria italica, Beauv. Agrost. (1812) p. 51. Annual; stems 2–5 ft. long, usually branched, tufted, rooting towards the base. Panicle dense, spike-like; bristles few, smooth or barbed. *The Italian Millet,* extensively cultivated as a food-grain throughout India. According to Watt (Dict. Econ. Prod. v. 6, part 2, p. 548), about 330,000 acres were under cultivation in the Bombay Presidency during the year 1886–87. Fl. B. I. v. 7, p. 78; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1170. *Panicum italicum,* Linn. Sp. Pl. (1753) p. 56; Grah. Cat. p. 237; Dalz. & Gibs. Suppl. p. 98.—VERN. *Rála.*

5. CHAMÆRAPHIS, Br.

Glabrous marsh or aquatic grasses. Leaves narrowly linear-lanceolate. Spikelets 1–2-flowered, subsessile and subsecund on the branches of a simple panicle which are produced as awn-like bristles beyond the ultimate spikelet, obscurely articulate but persistent on their short obconic pedicels, narrowly lanceolate, terete, green. Glumes 4; lower invol.-glume very small, suborbicular, hyaline, white, nerveless; upper invol.-glume longer than the lower floral glume, membranous, green, narrowly lanceolate, acuminate or narrowed into a rigid awn, 9–11-nerved; lower floral glume lanceolate, acute or aristately acuminate, paleate, 7-nerved, male, the palea smaller than the glume, hyaline; upper floral glume much smaller than the lower, stipitate, female, oblong or ovate-oblong, acute, flat, thinly coriaceous, nerveless, the palea hyaline, as broad as the glume, acute, nerveless. Lodicules cuneate. Stamens 3; anthers short. Styles free; stigmas laterally exserted. Grain minute, oblong, compressed, free within the subcoriaceous glume and hyaline palea.—DISTRIB. Tropical Asia and Australia; species 5 or 6.

1. **Chamæraphis spinescens,** *Poir. Encyc. Méthod. Suppl.* v. 2 (1811) p. 189. Forming floating much-branched masses with leafy ascending stems 1–3 ft. long. Leaves 1–3 by $\frac{1}{16}$–$\frac{1}{8}$ in., flat, acuminate, narrowly linear-lanceolate, smooth or scabrid, base narrowed; sheaths long, loose, with naked margins; ligule a ridge of minute hairs. Panicle 2–4 in. long, shortly pedunculate, more or less contracted; rhachis angular, sulcate; branches filiform, angular, grooved, flexuous, few- or many-flowered, the lower 1–2 in. long, the awn-like tips $\frac{1}{6}$–$\frac{1}{2}$ in. long. Spikelets (including their awn) $\frac{1}{4}$–$\frac{1}{3}$ in. long, subsessile. Glumes 4; lower invol.-glume scarcely $\frac{1}{30}$ in. long, orbicular or subquadrate, usually rounded at the apex, hyaline; upper invol.-glume $\frac{1}{4}$–$\frac{1}{3}$ in. long (including the awn), lanceolate, setosely scabrid on the sides, membranous, 9–11-nerved, with a long scabrid awn which is sometimes as long as the body of the glume; lower floral glume shorter than the upper invol.-glume, finely acuminate or awned, 7-nerved, male, paleate, membranous, the palea hyaline, smaller than the glume, linear-oblong, subacute; upper floral glume about $\frac{1}{12}$ in. long, ovate-lanceolate, acute, female, nerveless, the palea hyaline. Fl. B. I. v. 7, p. 62; Trim. Fl. Ceyl. v. 5, p. 165; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1171.—Flowers: Sept.

Konkan: Wangni, *Woodrow.*—Distrib. India (Rajputana, Bengal, W. Peninsula); Ceylon, China, Malaya, Australia.

I have seen no specimens from the Bombay Presidency; there are none from that Presidency in Herb. Kew.

6. ISACHNE, Br.

Perennial grasses. Leaves ovate or linear-lanceolate. Spikelets small or minute, loosely paniculate, not or obscurely articulate with the pedicel, subglobose or obovoid, 1–2-flowered. Glumes 4, the 2 lower often separately deciduous, thinly coriaceous or membranous, strongly nerved; invol.-glumes subequal, convex, empty; the 2 floral glumes both paleate, equal and convex, or the lower larger and flatter; lower floral glume male or neuter; upper floral glume jointed and often stipitate on the very short rachilla, hemispheric, female or hermaphrodite. Lodicules most minute. Stamens usually 3 (rarely 4 or 6). Styles 2, free; stigmas short, plumose, exserted at the top of the spikelet. Grain free within the hardened glume and palea.—Distrib. Species about 25, tropical and subtropical.

Invol.-glumes longer than the floral glumes ..... 1. *I. Lisboæ.*
Invol.-glumes about equalling the floral glumes.
  Floral glumes equal and similar, both hemispheric and coriaceous ..... 2. *I. elegans.*
  Floral glumes usually unequal, the lower floral glume thin, flat, often longer than the upper.
    Stem reaching 18 in. long; panicle rather large, ovoid or pyramidal; spikelets $\frac{1}{12}$ in. long; leaves 1–2½ in. long ... 3. *I. australis.*
    Stem rarely reaching 10 in. long; panicle small, lax-flowered; spikelets $\frac{1}{20}$–$\frac{1}{16}$ in. long; leaves 1–1½ in. long ..... 4. *I. miliacea.*

1. **Isachne Lisboæ,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 22. A low plant 6 in. high; stems creeping, with long wiry roots, then ascending, rather stout, leafy. Leaves 1–2 by $\frac{2}{3}$ in., recurved, thin, oblong-lanceolate, acute, ciliate on the margins with *long slender hairs*, closely and

conspicuously nerved; sheaths glabrous or sparsely hairy; ligule 0. Panicles 1–2 in. long; branches of the panicle (*spikes*) ½–¾ in. long, horizontally spreading. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. in diam., secund on the lower side of the branches, hairy with bulbous-based hairs; pedicels short, triquetrous, hairy. Glumes 4; lower and upper invol.-glumes equal, broadly ovate or suborbicular, acuminate, conspicuously 5-nerved, longer than the floral glumes, hairy; floral glumes orbicular, equal, smaller than the invol.-glumes, concave, glabrous. Palea with incurved flaps. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.—Flowers: Sept.-Oct.

DECCAN: Panchgani, *Raoji*!; Mahableshwar, *Cooke*!, *Lisboa*.—DISTRIB. Bombay Presidency, apparently endemic.

2. **Isachne elegans,** *Dalz. in Dalz. & Gibs. Bo. Fl.* (1861) p. 291. A small elegant grass 8–12 in. high; stems densely tufted, soft, geniculate below, and with slender fibrous roots. Leaves 2–6 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear-lanceolate, acute, striate, with thickened and glabrous or minutely serrulate margins; sheaths bristly at the mouth. Panicle 3–5 in. long, glabrous; branches slender, alternate, undulating, ½–1 in. long, smooth; pedicels short, glabrous. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. in diam., hispid, with 2 perfect flowers. Glumes 4; invol.-glumes equal, similar, inconspicuously many-nerved, broadly ovate or suborbicular, with red margins, hairy; floral glumes as long as the invol.-glumes, hemispheric, puberulous. Anthers $\frac{1}{16}$ in. long, brownish-yellow. Fl. B. I. v. 7, p. 23; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.—Flowers: Sept. VERN. *Dunda.*

KONKAN: Pen, in inundated land, *Dalzell*! DECCAN: margins of rivulets in the Deccan, *Dalzell & Gibson*; Poona, *Woodrow*; Lanoli, *Woodrow*, 175!; between Poona and Karli, *Jacquemont*, 556!—DISTRIB. Bombay Presidency apparently endemic.

3. **Isachne australis,** *R. Br. Prodr.* (1810) p. 196. Stem slender, erect or ascending from a creeping rootstock, 8–18 in. high, leafy, smooth, branched below; nodes glabrous. Leaves 1–2½ by $\frac{1}{6}$–$\frac{1}{3}$ in., linear-lanceolate, acuminate, flat, multistriate, scaberulous on both surfaces, base rounded; sheaths ¾–1½ in. long, striate, the margins above the middle densely ciliate; ligule a tuft of long slender erect white hairs. Panicle 1–4 in. long; branches alternate, flexuous, erect or spreading, up to 1½ in. long, sometimes divided; rhachis angular, smooth. Spikelets $\frac{1}{16}$–$\frac{1}{12}$ in. in diam., globose, sessile or pedicellate, green or violet; pedicels sometimes ¼ in. long, capillary. Glumes 4; invol.-glumes similar, broadly ovate or suborbicular, obtuse, concave, membranous, 7-nerved, glabrous or with a few bristles; floral glumes usually unequal, the lower longer and thinner than the upper, ovate, obtuse, nerveless; upper floral glume hemispheric, coriaceous, ciliolate. Palea glabrous. Anthers $\frac{1}{16}$ in. long, red. Fl. B. I. v. 7, p. 24; Trim. Fl. Ceyl. v. 5, p. 128; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1172.—Flowers: Oct. VERN. *Daura.*

DECCAN: Poona, *Lisboa*; Mahableshwar, *Woodrow*; Nasik, *Lisboa*.—GUJARAT: *Lisboa*.—DISTRIB. Throughout India; Ceylon, Australia, New Zealand.

4. **Isachne miliacea,** *Roth, Nov. Pl. Sp.* (1821) p. 58. A slender plant, variable in size, 6–10 in. high; stems very slender, prostrate,

widely creeping and branched below, then ascending. Leaves small, rather distant, ½–1½ by ⅛–⅓ in., ovate, acute, glabrous or sparsely hairy, base rounded. Panicle small, lax-flowered. Spikelets ⅒–⅛ in. in diam., globose, few and distant; pedicels short or long, capillary. Invol.-glumes orbicular-oblong, almost hemispheric, often hispid with long hairs, obscurely 7-nerved; lower floral glume rather longer than the upper, ovate-oblong, membranous, male; upper floral glume smaller, hemispheric, coriaceous, female. Palea glabrous. Fl. B. I. v. 7, p. 25; Trim. Fl. Ceyl. v. 5, p. 128; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1172.

Seems to be but a small state of *I. australis* with shorter leaves, laxer panicles, and smaller spikelets.

Konkan: *Woodrow*. Deccan: Lanoli, *Woodrow*!—Distrib. More or less throughout India; Ceylon, China, Malay and Pacific Islands, S. America.

7. TRICHOLÆNA, Schrad.

Erect tufted perennial (rarely annual) grasses. Leaves narrow; ligule a fringe of hairs. Spikelets 1–2-flowered, articulate on their pedicels, paniculate, laterally compressed, clothed with long silky hairs. Glumes 3 or 4; lower invol.-glume somewhat remote from the upper, often reduced to a minute scale or obsolete; upper invol.-glume membranous, emarginate or muticous, or finely mucronate or aristate from the sinus, 5-nerved, usually hairy; lower floral glume like the upper invol.-glume, male or barren, with a hyaline 2-nerved subequal palea; upper floral glume much smaller than the lower, thinly chartaceous, glabrous, shining, obtuse or emarginate, obscurely 5-nerved, 2-sexual. Lodicules 2, small. Stamens 3. Styles free.—Distrib. Species many, chiefly African.

Spikelets up to ⅛ in. long; lower invol.-glume minute or obsolete; lower floral glume apiculate (not awned) ..... 1. *T. Teneriffæ.*
Spikelets reaching ⅜ in. long; lower invol.-glume ⅒ in. long; lower floral glume awned ..... 2. *T. Wightii.*

1. **Tricolæna Teneriffæ,** *Parlat. in Webb & Berth. Phyt. Canar.* v. 3, part 2 (1848) p. 425. Perennial; stems many from a woody rootstock, geniculate below, slender, rigid. Leaves 1¼–3 by ⅒–⅛ in., narrowly linear-lanceolate, finely acuminate, convolute, rigid, glabrous; sheaths glabrous; ligule a narrow softly hairy ridge. Inflorescence of slender erect panicles 2½–4½ in. long; branchlets and pedicels capillary. Spikelets up to ⅛ in. long, clothed with silky hairs. Glumes 3 (rarely 4); lower invol.-glume minute or obsolete; upper invol.-glume ⅛ in. long, ovate, acute, densely silky; lower floral glume ⅛ in. long, ovate, acute, apiculate, paleate, the palea narrowly oblong, subobtuse, hyaline; upper floral glume ⅒ in. long, ovate-oblong, obtuse, coriaceous, shining; palea as long as the glume, oblong-lanceolate, subacute. Anthers ⅒ in. long, narrowly linear. Stigmas ⅒ in. long, exserted, sessile or nearly so, plumose. Fl. B. I. v. 7, p. 65; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.—Flowers: Aug.

Sind: *Stocks*, 639!; Thano-Bullo-Khan, *Woodrow*.—Distrib. India (Panjáb, W. Peninsula); westward to Sicily and N. Africa.

There is but one specimen (a very poor one) from Sind in Herb. Kew. collected by Stocks!

2. **Tricholæna Wightii,** *Nees, ex Steud. Syn. Gram.* (1855) p. 93. Stems 6–18 in. high, tufted, stout or slender. Leaves 1–6 by $\frac{1}{6}$–$\frac{1}{4}$ in., linear, finely acuminate, flat, glabrous or hairy; sheaths glabrous or hairy with bulbous-based hairs; ligule a hairy line. Inflorescence a narrow panicle 2–5 in. long; branchlets and pedicels capillary, flexuous. Spikelets variable in size, sometimes exceeding $\frac{3}{8}$ in. long (including the awns), silky-hairy. Glumes 4; lower invol.-glume $\frac{1}{10}$ in. long, linear, obtuse, distant from the others, strongly bearded at the base; upper invol.-glume ovate-lanceolate, tumid at the base, obtuse or subacute, silky-hairy, the midnerve produced from the back into a capillary awn nearly $\frac{1}{8}$ in. long; lower floral glume similar to the upper invol.-glume, with a similar awn, silky-hairy, paleate, male, the palea narrow, hyaline; upper floral glume $\frac{1}{10}$ in. long, elliptic-oblong, obtuse, concave, smooth, thin, 2-sexual; palea as long as the glume. Anthers $\frac{1}{10}$ in. long. Stigmas $\frac{1}{8}$ in. long, with distinct styles free to the base or nearly so. Fl. B. I. v. 7, p. 65; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.—Flowers: Sept. VERN. *Chota-Kagli.*

DECCAN: Malhargad, *Woodrow*; Poona, *Woodrow*; Mahableshwar, *Lisboa*; Panchgani, *Lisboa*. S. M. COUNTRY: Badami, *Woodrow*, 23!—DISTRIB. India (Rajputana, W. Peninsula); Arabia, Cape Verd Islands.

8. **AXONOPUS,** Beauv.

Annual or perennial grasses of various habit. Leaves subradical; ligules membranous, ciliate or reduced to a ciliate rim. Panicles consisting of digitate or more or less whorled slender or stout often spike-like racemes. Spikelets ovoid or oblong, mucronate or awned, solitary, 2-nate or fasciculate, 2-flowered, articulate on thin pedicels, erect. Glumes 4; lower invol.-glume shorter than the spikelet, hyaline, acuminate or aristate, 3-nerved; upper invol.-glume as long as the upper floral glume, ovate, 5-nerved, the lateral nerves marginal and hairy or villous; floral glumes subequal; lower oblong-ovate, 5-nerved, paleate, male, the palea small, 2-partite; upper floral glume 2-sexual, ovate or oblong, narrowed into a terminal awn, thinly coriaceous; palea oblong-elliptic. Lodicules flabelliform. Stamens 3; anthers linear. Styles free; stigmas linear, laterally exserted, shortly penicillate. Grain oblong, free within the hardened glume and palea.—DISTRIB. Species 3, one from South Africa and the Mascarene Islands to India and Australia, one in the Indo-Malayan region, the third in Tropical Africa.

1. **Axonopus cimicinus,** *Beauv. Agrost.* (1812) p. 12. A tufted grass; stems 1–2 ft. long, erect, or decumbent at the base; nodes hairy. Leaves 1–3 by $\frac{3}{8}$–$\frac{5}{8}$ in., ovate-lanceolate from a broad cordate base, acute, flat, glabrous or hairy, ciliate on the margins with stiff bulbous-based hairs; sheaths glabrous or hairy; ligule of short hairs. Inflorescence in spike-like racemes, 3–10 on the top of a slender smooth glabrous peduncle 2–6 in. long, with sometimes a fascicle of 2 or more lower down on the peduncle; peduncle naked in the lower part; rhachis of raceme angular, scaberulous, slender. Spikelets (including a slender scaberulous awn about $\frac{1}{8}$ in. long) $\frac{1}{4}$–$\frac{5}{16}$ in. long, subsecund, solitary or 2-(rarely 3-)nate, erect, readily disarticulating from the pedicel; pedicels unequal, scaberulous, cupular at the tip. Glumes 4; lower invol.-glume

rather more than $\frac{1}{10}$ in. long, narrowly ovate-lanceolate, aristately acuminate, hyaline, with 3 slender green nerves, of which the 2 lateral arch to join the midrib below the tip; upper invol.-glume $\frac{1}{5}$ in. long, broadly ovate, cuspidately acuminate, thinly membranous, 5-nerved, the 3 central nerves slender, green, the 2 lateral nerves marginal, bristly with long coarse purplish hairs which reach $\frac{1}{10}$ in. long; lower floral glume $\frac{1}{6}$ in. long, ovate-oblong, obtuse, male, paleate, the palea small, 2-partite; upper floral glume $\frac{1}{4}$ in. long (or more), including the awn, which is nearly as long as the glume, ovate, acute, coriaceous, often faintly ciliolate and with slightly incurved margins; palea as long as the glume, coriaceous, elliptic-oblong, subobtuse. Fl. B. I. v. 7, p. 64; Trim. Fl. Ceyl. v. 5, p. 166; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1173. *Urochloa cimicina*, Kunth, Revis. Gram. (1829) v. 1, p. 31; Dalz. & Gibs. p. 289.—Flowers: Oct.

KONKAN: *Stocks*! S. M. COUNTRY: Dharwar, *Woodrow*; Badami, *Woodrow*!

9. **OPLISMENUS**, Beauv.

Slender leafy weak grasses; stems creeping below; branches ascending. Leaves ovate-lanceolate, acuminate, thin, flat; margins scaberulous, base narrow, auricled on one side; ligule a ridge of long hairs. Spikelets solitary or 2-nate, disarticulating at the base, in small clusters or in spike-like more or less secund racemes along a common axis, subterete, awned. Glumes 4; invol.-glumes similar, more or less subequal, herbaceous to membranous, 3–7-nerved, both usually with straight awns; lower floral glume resembling the upper invol.-glume, 5–9-nerved, empty, muticous or very shortly awned, with or without a hyaline 2-nerved or more or less reduced palea; upper floral glume 2-sexual, as long as or shorter than the lower, chartaceous to coriaceous, 5–7-nerved, muticous; palea of similar texture, about equal to the glume, 2-nerved. Lodicules 2, minute, cuneate. Stamens 3. Styles distinct, long; stigmas exserted at the top of the glume. Grain oblong-ellipsoid, free within the hardened glume and palea.—DISTRIB. Species about 8, in the warmer parts of the world.

A tall branching grass; awns stout, smooth, obtuse ..... 1. *O. compositus.*
A small diffuse grass; awns capillary, minutely scaberulous ..... 2. *O. Burmanni.*

1. **Oplismenus compositus,** *Beauv. Agrost.* (1812) p. 54. A tall branching grass; stems 1–3 ft. long, slender, branched, and creeping below; branches ascending, leafy, rooting from the lower nodes. Leaves variable, 2–6 by $\frac{1}{2}$–$\frac{3}{4}$ in., ovate to ovate-lanceolate, acuminate, thin, flat, glabrous or hairy, base narrow, auricled on one side; sheaths glabrous or pubescent, with ciliate margins. Panicle 3–10 in. long; peduncle long or short; branches of panicle usually distant, 1–3 in. long; rhachis glabrous or pubescent, angular, grooved. Spikelets distant, $\frac{1}{6}$ in. long (excluding the awn), lanceolate-ellipsoid, green; pedicels very short, often with a tuft of hairs at the base. Glumes 4; lower invol.-glume ovate-lanceolate, acuminate, $\frac{1}{10}$ in. long (without the awn, which is about $\frac{1}{5}$ in. (or more) long and truncate at the apex, glabrous, often purple), 5-nerved, membranous; upper invol.-glume $\frac{1}{8}$ in. long (including a short mucro or awn), rather broader than the lower invol.-glume, 5–7-nerved, membranous; lower floral glume, $\frac{1}{6}$ in. long, membranous, broadly ovate, subacute, the midrib prolonged behind

into a very short apiculation, 7–9-nerved with a very narrow palea; upper floral glume shorter than the lower, ovate-oblong, acute, coriaceous, smooth, shining, with incurved margins; palea oblong, acute, with strongly involute margins. Fl. B. I. v. 7, p. 66; Trim. Fl. Ceyl. v. 5, p. 168; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1173. *Oplismenus lanceolatus*, Kunth, Revis. Gram. (1829) p. 45; Dalz. & Gibs. p. 292.—Flowers: Nov.–Dec.

KONKAN: at the foot of the Ghâts under the shade of trees, *Dalzell & Gibson*; Matheran, *Woodrow*; Thana, *Lisboa*. DECCAN: Lanoli, *Lisboa*. KANARA: Kadgal (N. Kanara), *Woodrow*!—DISTRIB. Throughout India; Ceylon, most tropical regions (except Australia).

2. **Oplismenus Burmanni**, *Beauv. Agrost.* (1812) p. 54. A very slender diffusely branched leafy grass; stems 6–18 in. long; nodes glabrous or hairy. Leaves $\frac{3}{4}$–2 by $\frac{1}{4}$–$\frac{1}{2}$ in., ovate or ovate-lanceolate, acuminate, sparsely pilose with long slender white hairs; sheaths glabrous or hairy. Panicle 1–2½ in. long; peduncle slender (almost filiform), usually very long; branches of panicle spike-like, few, distant, subsessile, $\frac{1}{8}$–$\frac{3}{4}$ in. long; rhachis slender, angular, clothed with long slender white hairs nearly as long as the spikelets. Spikelets $\frac{1}{10}$ in. long (excluding the awns), secund, solitary or 2-nate; pedicels short, hairy. Glumes 4; lower invol.-glume $\frac{1}{16}$ in. long (excluding the acute scaberulous capillary awn which reaches $\frac{1}{3}$ in. long), ovate, obtuse, 3–5-nerved, hyaline, silky-hairy and ciliate; upper invol.-glume similar and subequal to the lower, 5-nerved, with an awn reaching $\frac{1}{5}$ in. long; lower floral glume reaching $\frac{1}{10}$ in. long (excluding an awn of about $\frac{1}{20}$ in. long), broadly ovate, subobtuse, concave, hyaline, silky-hairy, and ciliate, 7–9-nerved, empty, epaleate; upper floral glume as long as the lower, ovate, acute, membranous, with incurved margins; palea as long as the glume, membranous, ovate-oblong, acute, with strongly involute margins. Fl. B. I. v. 7, p. 68; Dalz. & Gibs. p. 291; Trim. Fl. Ceyl. v. 5, p. 169; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1173.—Flowers: Sept.–Oct.

Found usually under the shade of trees throughout the Presidency, *Dalzell & Gibson*. KONKAN: Parel (Bombay), *Woodrow*. DECCAN: Panchgani, *Woodrow*. GUJARAT: Domas (near Surat), *Cooke*!—DISTRIB. Throughout India; Ceylon, Malay Islands, China, Japan, Tropical Africa.

10. **PANICUM**, Linn.

Annual or perennial grasses of various habit. Leaves broad or narrow; ligules usually reduced to a ciliate rim or a fringe of hairs (rarely a distinct membrane) or 0. Inflorescence various. Spikelets small, 1-2-flowered, terete or dorsally or laterally compressed, solitary or 2-nate, often secund, ovoid or oblong, articulate at the base and deciduous, rarely awned. Glumes 4; invol.-glumes empty; the lower the smallest (sometimes minute) and fewest-nerved; upper invol.-glume usually equal or almost equal to the lower floral glume, sometimes cuspidate, 5–13-nerved; lower floral glume equalling the upper or longer, more or less resembling the upper invol.-glume, usually neuter, paleate or not; upper floral glume coriaceous to crustaceous, sometimes shortly stipitate, convex, 2-sexual, paleate, the palea usually as long as and of the same texture as the glume. Lodicules 2, cuneate. Stamens 3. Styles distinct; stigmas laterally exserted near the top of the spikelet.

Grain free but tightly enclosed by the hardened glume and palea, oblong, ellipsoid or lanceolate.—DISTRIB. Species 200–250, chiefly in the warm regions of the world.

Spikelets dorsally compressed or subterete.
Inflorescence racemose, of simple (rarely branched) spikes or racemes bearing secund spikelets.
Rhachis of spikes broad, flattened.
Spikelets 2-seriate.
Spikes shorter than the internodes ..... 1. *P. flavidum.*
Spikes longer than the internodes.
Upper floral glume granulate ..... 2. *P. punctatum.*
Upper floral glume smooth ..... 3. *P. fluitans.*
Spikelets 3–5-seriate; lower floral glume cuspidate or awned.
Stems stout, reaching 5 ft. long; lower floral glume awned ..... 4. *P. stagninum.*
Stems slender, decumbent, 1–2 ft. long; lower floral glume cuspidate, not awned ..... 5. *P. colonum.*
Rhachis of spikes narrow and filiform, terete or angular.
Lower invol.-glume minute, not ¼ as long as the upper floral glume, nerveless.
Leaf-base rounded; lower invol.-glume triangular ..... 6. *P. Isachne.*
Leaf-base cordate-amplexicaul; lower invol.-glume semilunate ..... 7. *P. prostratum.*
Lower invol.-glume from ⅓–½ as long as the upper floral glume, 3–5-nerved.
Upper floral glume apiculate or awned.
Upper floral glume only apiculate.
Lower invol.-glume ovate, acute, ¼ as long as the upper floral glume ..... 8. *P. ramosum.*
Lower invol.-glume orbicular, about ⅓ as long as the upper floral glume . 9. *P. setigerum.*
Upper floral glume abruptly awned; lower invol.-glume rather less than ½ the lower floral glume ..... 10. *P. javanicum.*
Inflorescence of spiciform or effuse panicles.
Panicles narrow, spiciform.
Lower invol.-glume very minute; spikelets lanceolate ..... 11. *P. interruptum.*
Lower invol.-glume ¼ as long as the upper; spikelets globosely ovoid ..... 12. *P. myosuroides.*
Panicles broad, effuse.
Lower invol.-glume as long as the lower floral glume or nearly so ..... 13. *P. turgidum.*
Lower invol.-glume shorter than the lower floral glume.
Annuals.
Leaves ⅝ in. broad; panicle 15 in. long ..... 14. *P. obscurans.*
Leaves ⅛–¼ in. broad; panicle 4–10 in. long . 15. *P. trypheron.*
Perennials.
Lower invol.-glumes very minute, 1 or rarely both often obsolete ..... 16. *P. subeglume.*
Lower invol.-glumes distinctly evident.
Spikelets laxly clustered on the branches... 17. *P. antidotale.*
Spikelets solitary (rarely 2-nate).
Lower invol.-glume not ¼ the length of the upper, orbicular or reniform ..... 18. *P. proliferum* var. *paludosum.*
Lower invol.-glume ½ the length of the upper, ovate, subacute ..... 19. *P. montanum.*
Spikelets strongly laterally compressed, gibbously ovoid ... 20. *P. patens.*

1. **Panicum flavidum,** *Retz. Obs.* fasc. 4 (1786) p. 15. Stems 1–4 ft. long, slender, ascending from a short decumbent base; nodes glabrous. Leaves sub-bifarious, 3–5 by $\frac{1}{6}$–$\frac{1}{3}$ in., narrowly linear, acuminate, thinly coriaceous, glabrous or the margins slightly scaberulous; sheaths compressed, glabrous, the margins not ciliate; ligule a ridge of long hairs. Spikes few or many, distant, erect, $\frac{1}{2}$–1 in. long, shorter than the internodes, secund, sessile; rhachis flattened, glabrous. Spikelets $\frac{1}{10}$ in. long, gibbously globose, sessile or nearly so, 2-seriate, closely imbricate, glabrous. Glumes 4, pale-green or nearly white, the 3 lower with green nerves; lower invol.-glume about $\frac{1}{2}$ as long as the spikelet, orbicular, concave, 3-nerved; upper invol.-glume broadly ovate, concave, shorter than the upper floral glume, 7-nerved; lower floral glume shorter than the upper, orbicular, 5-nerved, paleate, empty; upper floral glume broadly ovate or almost orbicular, often mucronate, very convex, striolate-punctate, white. Palea with the sides infolded nearly to the middle, striolate. Fl. B. I. v. 7, p. 28; Trim. Fl. Ceyl. v. 5, p. 133; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1174; Watt, Dict. Econ. Prod. v. 6, part 1, p. 8. *Panicum brizoides*, Jacq. Eclog. Gram. (1813) p. 2; Dalz. & Gibs. p. 290.—Flowers: Oct.

KONKAN: N. & S. Konkan, *Law!* DECCAN: Khandala, *Woodrow.* GUJARAT: near Surat, *Dalzell & Gibson*; Morvi (Kathiawar), *Woodrow*; Porbander (Kathiawar), *Woodrow.*—DISTRIB. Plains of India; Ceylon, Trop. Asia and Africa.

2. **Panicum punctatum,** *Burm. Fl. Ind.* (1768) p. 26. Perennial, quite glabrous; stem prostrate at the often floating base, 2–4 ft. long, rooting at the lower stout spongy nodes. Leaves 4–8 by $\frac{1}{4}$–$\frac{3}{8}$ in., linear, acute or acuminate, base narrow; lower sheaths inflated; ligule a ridge of hairs. Spikes many, $\frac{1}{2}$–1 in. long, distant, sessile, longer than the internodes, appressed to the glabrous rhachis, very pale. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, imbricate, sessile, 2-seriate, ovoid-oblong on a flattened undulate rhachis which is produced beyond the spike into an acicular tip which is as long as or longer than the terminal spikelet. Glumes 4; lower invol.-glume small, about $\frac{1}{20}$ in. long, orbicular, rounded or slightly retuse at the apex, thinly membranous; upper invol.-glume about $\frac{1}{2}$ as long as the floral glumes, membranous, 3–5-nerved, orbicular, with truncate or rounded tip; lower floral glume ovate, acute, 3–5-nerved, membranous, neuter; upper floral glume about as long as the lower, cuspidately acuminate, thinly coriaceous, granulate, white. Palea coriaceous, with inflexed membranous sides. Anthers $\frac{1}{20}$ in. long. Fl. B. I. v. 7, p. 29; Trim. Fl. Ceyl. v. 5, p. 134; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1174. *Panicum fluitans*, Retz. Obs. fasc. 3 (1783) p. 8 (not fasc. 5, p. 18); Grah. Cat. p. 237; Dalz. & Gibs. p. 290.—Flowers: Nov. VERN. *Petnar.*

DECCAN: Poona, *Woodrow, Lisboa*; Ahmednagar, *Woodrow.*—DISTRIB. Throughout India in marshes; Ceylon, Malaya, Mauritius, Trop. and N. Africa.

3. **Panicum fluitans,** *Retz. Obs.* fasc. 5 (1789) p. 18.—Perennial; stem 1–4 ft. long from a stout creeping base, often as thick as a swan's quill, smooth, soft, striate; lower nodes 2–5 in. long, quite glabrous. Leaves 4–8 by $\frac{1}{4}$–$\frac{3}{8}$ in., linear, finely acuminate, glabrous, the margins smooth or nearly so, often incurved, base narrow; sheaths large, loose, glabrous, the margins not ciliate; ligule a ridge of hairs. Panicle 8–12 in. long; rhachis erect, angular, glabrous or nearly so. Spikes

many, ½–1½ in. long, sessile, longer than the internodes, often appressed to the rhachis; rhachis of spikes flattened. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovoid, acute, glabrous, 2-seriate, imbricate. Glumes 4; lower involglume $\frac{1}{20}$ in. long, broader than long, thinly membranous, without nerves, white; upper involglume ovate, acute, concave, thinly membranous, with 5–7 green nerves, slightly shorter than the upper floral glume; lower floral glume subcoriaceous, 5–7-nerved, paleate, empty or male; upper floral glume broadly ovate, mucronate, thinly coriaceous, smooth or nearly so; palea with inflexed membranous margins. Trim. Fl. Ceyl. v. 5, p. 135; Prain, Beng. Pl. p. 1174. *Panicum paspaloides* (*paspalodes*), Pers. Syn. v. 1 (1805) p. 81; Hook. f. Fl. B. I. v. 7, p. 30; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.

Dalzell without locality in Herb. Kew.! SIND: *Stocks*!; Manchar Lake, *Stocks*!, *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, Afghanistan, Arabia, Tropical Africa and America.

4. **Panicum stagninum,** *Retz. Obs.* fasc. 5 (1789) p. 17. Annual or perennial; root-fibres many, long, wiry, with numerous filiform rootlets; stem erect from a geniculate or prostrate base, reaching 5 ft. (or more) long, sometimes rooting from the lower nodes. Leaves 6–18 by ⅛–½ in., linear, tapering to a fine point; sheaths striate, smooth, glabrous; ligule a fringe of stiff hairs. Panicle 4–8 in. long; rhachi slender, more or less flexuous, angular, grooved, scabrid on the ridges and with scattered bristles; branches few or many, distant or close, alternate, usually suberect, 1–2 in. long, sessile or nearly so with a tuft of hairs at the base; rhachis of the branches angular, grooved, clothed sparingly with bulbous-based hairs. Spikelets crowded, ovoid-lanceolate, ⅛–⅕ in. long (excluding the awn), hairy with bulbous-based hairs, pale; pedicels very short with enlarged tips. Glumes 4; lower involglume $\frac{1}{10}$ in. long (half as long as the spikelet), broadly ovate or suborbicular, cuspidate, 3-nerved, hairy and ciliate, thinly membranous; upper involglume ⅕ in. long (including the mucro), broadly ovate, concave, hairy and ciliate with bulbous-based hairs, thinly membranous, 7-nerved in the upper part with green nerves, acuminate or produced into a short compressed scabrid awn; lower floral glume like the upper involglume with an awn varying from ⅙–1 in. long, paleate, male, the palea hyaline, as long as the glume; upper floral glume ⅛ in long, ovate-lanceolate, mucronate, straw-colored, shining, faintly striolate, with involute margins, coriaceous; palea as long as the glume, elliptic-oblong, acute, striolate, with inflexed margins. Roxb. Fl. Ind. v. 1 (1832) p. 295; Grah. Cat. p. 237 (misspelt *staginum*); Stapf, in Dyer, Fl. Capen. v. 7 (1899) p. 394. *Panicum Crus-galli* var. *stagninum*, Trim. ex Hook. f. in Trim. Fl. Ceyl. v. 5, p. 136; Prain, Beng. Pl. p. 1174. *P. Crus-galli*, Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433 (*not* of Linn.). *Oplismenus stagninus*, Kunth, Rev. Gram. v. 1 (1827) p. 44; Dalz. & Gibs. p. 292.—Flowers: Oct.

Throughout the Presidency in wet places, especially in cultivated ground and in ditches.—DISTRIB. More or less throughout India; Ceylon, most warm countries.

I do not believe that the true *P. Crus-galli* of Linnæus occurs anywhere in the Bombay Presidency, *P. stagninum*, which has been restored to specific rank by Stapf (Fl. Capen. l. c.), having been mistaken for it. Dalzell's *Oplismenus Crus-galli*, which has been cited in the 'Flora of British India' (v. 7, p. 31) as a synonym for *P. Crus-galli*, is undoubtedly *Panicum Isachne*. *P. stagninum* is a tall plant which

grows in water-holes and places where water has lodged; it has a conspicuous ligule of a fringe of hairs, as noticed by Dr. Stapf in his clavis on p. 384 in the 'Flora Capensis,' while *P. Crus-galli* has no ligule.

VAR. *frumentacea*, Trim. Cat. Ceyl. Pl. (1885) p. 104. Tall, robust; panicle often nodding; spikes thickened, often incurved, sometimes branched and corymbosely panicled, lower floral glume cuspidate but not awned. Fl. B. I. v. 7, p. 31; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1174. *Panicum frumentaceum*, Roxb. Fl. Ind. v. 1 (1832) p. 304; Grah. Cat. p. 237; Watt, Dict. Econ. Prod. v. 6, part 1, p. 9. *Oplismenus frumentaceus*, Dalz. & Gibs. Suppl. p. 98. —VERN. *Shamula.*

Cultivated in and near the Ghát districts. The quickest growing of all the millets and in some localities can be harvested within six weeks after being sown (*Watt*).

5. **Panicum colonum,** *Linn. Syst.* ed. 10 (1759) p. 870. Annual; stem 1–2 ft. long, slender, decumbent or shortly creeping below; nodes glabrous or puberulous. Leaves 4–8 by $\frac{1}{6}$–$\frac{1}{3}$ in., narrowly lanceolate or linear, acuminate, flat, glabrous, with scaberulous margins; sheaths up to 6 in. long; ligule 0. Spikes 8–20, suberect, usually distant, $\frac{1}{2}$–1 in. long; rhachis stout, angular, scaberulous on the angles. Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long, globosely ovoid, acute or subcuspidate, more or less hispidly pubescent, secund, sessile, 3–5-seriate. Glumes 4; lower invol.-glume about $\frac{1}{2}$ as long as the lower floral glume, broadly ovate or suborbicular, membranous, 3-nerved, ciliolate; upper invol.-glume about equal to the lower floral glume, broadly ovate, cuspidate, concave, 5–7-nerved, hairy; lower floral glume similar, empty, with a hyaline palea; upper floral glume coriaceous, broadly ovate, turgid, acute, finely striolate, polished, yellowish-white, with a coriaceous palea. Very similar to *P. frumentaceum*, Roxb., but a more slender plant with smaller spikelets. Fl. B. I. v. 7, p. 32; Grah. Cat. p. 237; Trim. Fl. Ceyl. v. 5, p. 136; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1174; Watt, Dict. Econ. Prod. v. 6, part 1, p. 7. *Oplismenus colonus*, H. B. & K. Nov. Gen. & Sp. v. 1 (1815) p. 108; Dalz. & Gibs. p. 291.—Flowers: Oct. VERN. *Bovur*; *Sáma.*

KONKAN: *Stocks*! S. M. COUNTRY: Londa, *Woodrow*. GUJARAT: Morvi (Kathiawar), *Woodrow*.—SIND: *Stocks*, 650!, *Woodrow*; Shikarpur, *Woodrow*.—DISTRIB. Throughout the plains of India; Ceylon, most warm countries.

6. **Panicum Isachne,** *Roth, Nov. Pl. Sp.* (1821) p. 54. Annual; stems many, 1–2 ft. long, ascending from a decumbent or creeping and rooting base, geniculate, very slender, with villous nodes, otherwise glabrous, much branched below, simple above. Leaves 1–2 by $\frac{1}{12}$–$\frac{1}{5}$ in., lineár-lanceolate from a rounded base, acute, subpungent, glabrous or sparsely hairy with scaberulous margins; sheaths glabrous or hairy, ciliate on the upper part; ligule a fringe of hairs. Inflorescence 2–3 in. long, erect, consisting of 6–12 secund or subsecund racemosely arranged spikes $\frac{1}{2}$–1 in. long, longer than the internodes, sessile or shortly pedunculate, usually appressed to the triquetrous slender hairy rhachis. Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long, secund, closely imbricate in 2 series, oblong, subacute or obtuse, softly hairy; rhachis of spikes triquetrous, hairy, about $\frac{1}{50}$ in. in diam.; pedicels very short. Glumes 4; lower invol.-glume minute, triangular, membranous, glabrous; upper invol.-

glume membranous, oblong, obtuse, 5-nerved, hispidly pubescent; lower floral glume narrower, 3-nerved, paleate, neuter or sometimes male, with hyaline palea; upper floral glume shorter, oblong, obtuse dorsally flattened, coriaceous, glabrous, shining, 2-sexual, with coriaceous palea. Anthers $\frac{1}{25}$ in. long. Fl. B. I. v. 7, p. 28; Trim. Fl. Ceyl. v. 5, p. 133; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1174. *Panicum eruciforme*, Sibth. & Sm. Fl. Græc. Prodr. v. 1 (1806) p. 40 & Fl. Græc. t. 59. *Oplismenus Crus-galli*, Dalz. & Gibs. Bo. Fl. (1861) p. 292 (*not* of Dum.).—Flowers: Sept.–Jan.

Dalzell without locality in Herb. Kew.! DECCAN: Poona, *Jacquemont*, 452!, *Woodrow*. GUJARAT: Surat, *Dalzell*!—DISTRIB. Throughout the plains of India in watery places; Ceylon, westward to Italy, Africa.

7. **Panicum prostratum,** *Lamk. Illustr.* v. 1 (1791) p. 171. A slender annual grass; stem 4–18 in. long, ascending from a long creeping base, often branched below; nodes pubescent; internodes 1–3 in. long. Leaves 1–2 by $\frac{1}{4}$–$\frac{5}{8}$ in., ovate-lanceolate from a cordate amplexicaul base, acuminate, thin, flat, nearly glabrous or quite glabrous above, often clothed with long hairs beneath, sometimes nearly glabrous; sheaths slender, with ciliate margins; ligule a tuft of white hairs or 0. Racemes 5–8, alternate, secund, $\frac{1}{2}$–$1\frac{1}{4}$ in. long, sessile or shortly pedunculate, distichously spreading; rhachis of racemes slender, angular. Spikelets $\frac{1}{16}$–$\frac{1}{12}$ in. long, solitary or binate, secund, ellipsoid, somewhat turgid, subacute, glabrous or hairy; pedicels very short, with long slender hairs at the tip below the spikelet. Glumes 4; lower invol.-glume minute, semilunate, hyaline, nerveless; upper invol.-glume about equalling the lower floral glume, membranous, broadly ovate, acute, pubescent, 7-nerved; lower floral glume 5-nerved, empty, with hyaline palea; upper floral glume elliptic, dorsally rounded, thinly coriaceous, finely striolate, nearly white, with subcoriaceous palea. Anthers $\frac{1}{30}$ in. long. Fl. B. I. v. 7, p. 33; Dalz. & Gibs. p. 290; Trim. Fl. Ceyl. v. 5, p. 138; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1175; Watt, Dict. Econ. Prod. v. 6, part 1, p. 15.—Flowers: Sept. VERN. *Chimanchara.*

DECCAN: Poona, *Woodrow*. GUJARAT: Surat, *Dalzell & Gibson, Lisboa*; Kathiawar, *Woodrow*. SIND: *Woodrow*.—DISTRIB. Plains of India; Ceylon, Tropics generally.

8. **Panicum ramosum,** *Linn. Mantiss.* (1767) p. 29. Annual; stem 1–3 ft. long, erect or ascending from a shortly creeping base, slender or rather stout, much branched from the base upwards, usually glabrous, leafy; nodes pubescent. Leaves 2–5 by $\frac{1}{6}$–$\frac{1}{2}$ in., linear-lanceolate, finely acuminate, thin, flat, smooth, glabrous or pubescent beneath, with scaberulous margins, base rounded; sheaths glabrous or pubescent, ciliate or not towards the mouth; ligule a fringe of short hairs. Panicle 2–6 in. long, subpyramidal, with a long peduncle; rhachis angular; branches of panicle 5–10, distant, 1–2 in. long, alternate or the lower opposite, erect or spreading, shorter upwards; rhachis of racemes slender, angular, puberulous. Spikelets alternate, $\frac{1}{10}$–$\frac{1}{8}$ in. long, close or distant, often in pairs (a sessile and a pedicellate one), ovoid, acute, pubescent, turgid, pale green or yellowish; pedicels with a few long hairs near the tip. Glumes 4; lower invol.-glume $\frac{1}{2}$ as long as the lower floral glume, ovate, acute, hyaline; upper invol.-glume about equalling the lower floral glume, ovate, acute, cuspidate, 5-nerved; lower floral glume similar but slightly broader, with membranous palea,

empty; upper floral glume coriaceous, ovoid-oblong, acute, rugulose, with coriaceous palea. Fl. B. I. v. 7, p. 36; Trim. Fl. Ceyl. v. 5, p. 140; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1175. *Panicum Helopus*, Watt, Dict. Econ. Prod. v. 6, part 1, p. 10 (partly). *P. umbrosum*, Retz. Obs. fasc. 4 (1786) p. 16; Roxb. Fl. Ind. v. 1 (1832) p. 297.—Flowers: Aug.-Nov.

DECCAN: Poona, *Woodrow, Lisboa.* S. M. COUNTRY: Badami, *Woodrow.*—DISTRIB. Throughout India; Ceylon, Afghanistan.

9. **Panicum setigerum,** *Retz. Obs.* fasc. 4 (1786) p. 15. Stems 2–3 ft. long, prostrate and widely straggling below, branched, slender, firm; nodes bearded, the lower rooting; internodes 1–2 in. long. Leaves 3–5 by $\frac{3}{8}$–$\frac{7}{8}$ in., ovate-lanceolate from a cordate, amplexicaul, more or less ciliate base, finely acuminate, flat, thin, with slender midrib, 5–6 pairs of nerves and scabrid margins; sheaths glabrous except at the back beneath the leaf-blade, with ciliate margins; ligule a tuft of long woolly hairs. Inflorescence of 3–10 racemes 1–2 in. long, the lower very distant, alternate; rhachis of racemes angular, glabrous or pubescent, villous at the base. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, loosely imbricate, 2-seriate (one often pedicellate, the other sessile), secund, ovoid, acute or acuminate, glabrous or pubescent; pedicels pubescent and with long spreading slender hairs on or below the pedicel. Glumes 4; lower invol.-glume about $\frac{1}{3}$ as long as the upper, orbicular, thinly membranous; upper invol.-glume broadly ovate, acute or acuminate, 7-nerved, membranous; lower floral glume about equal to the upper invol.-glume, 5-nerved, paleate, neuter, the palea membranous, as long as the glume, subacute; upper floral glume elliptic, obtuse, shortly apiculate, coriaceous, granulate, with narrowly incurved margins, the palea coriaceous, elliptic-oblong, obtuse. Fl. B. I. v. 7, p. 36; Trim. Fl. Ceyl. v. 5, p. 141; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1175.—Flowers: Sept.-Dec.

DECCAN: Poona, *Woodrow.*—DISTRIB. India (Bengal, W. Peninsula); Ceylon.

VAR. *tomentosa*, Hook. f. Fl. B. I. v. 7 (1896) p. 37. Margins of leaves and sheaths with long white hairs; spikelets larger, $\frac{1}{6}$ in. long, tomentose; awn longer.

GUJARAT: Rajkot (Kathiawar), *Woodrow*, 45!

10. **Panicum javanicum,** *Poir. Encyl. Suppl.* v. 4 (1816) p. 274. Annual; stem 1–2 ft. long, decumbent and rooting below, geniculately ascending, branching upwards; nodes pubescent. Leaves 1–5 by $\frac{1}{4}$–$\frac{1}{2}$ in., ovate-lanceolate, from a rounded, cordate, or amplexicaul base, acuminate, softly hairy on both sides, with scaberulous margins; sheaths loose, softly hairy, the mouth villous; ligule a beard. Panicle erect; branches 6–12, rather distant; rhachis of racemes compressed, glabrous or pubescent. Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. long, secund, 2-seriate, loosely imbricate, subsessile or very shortly pedicellate, ovoid, acute, pubescent, tomentose, or villous; pedicels pubescent and with a few long hairs near the tip. Glumes 4; lower invol.-glume ovate, acute or obtuse, not $\frac{1}{2}$ as long as the upper invol.-glume, 3-nerved or nerveless; upper invol.-glume as long as and similar to the lower floral glume, ovate, acute, 7-nerved; lower floral glume similar, 5-nerved, empty or male, with membranous palea; upper floral glume crustaceous,

broadly ovate-oblong, rugulose, the tip rounded, abruptly cuspidate with a long mucro, concealed by the lower glumes, and with a crustaceous palea. Fl. B. I. v. 7, p. 35; Trim. Fl. Ceyl. v. 5, p. 142; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1175. *Panicum Helopus*, Watt, Dict. Econ. Prod. v. 6, part 1, p. 10 (partly). *Urochloa panicoides*, Beauv. Agrost. p. 53; Dalz. & Gibs. p. 290.—Flowers: Aug.–Nov. VERN. *Phadya*; *Kuri*. Distinguished from *P. ramosum* by the awned upper floral glume.

Dalzell without locality in Herb. Kew.!; common in cultivated plains, *Lisboa*. DECCAN: N. Khandesh, *Woodrow*; Poona, *Woodrow*, *Jacquemont*, 390!; Dapuri near Poona, *Jacquemont*, 482! S. M. COUNTRY: Badami, *Woodrow*. GUJARAT: Baroda, *Cooke*!—DISTRIB. Plains of India; Ceylon, Tropics generally. A good fodder grass for horses and cattle.

11. **Panicum interruptum,** *Willd. Sp. Pl.* v. 1 (1797) p. 341. A large perennial grass, quite glabrous; stem reaching 5–6 ft. long, ascending from a stout creeping and rooting or floating rootstock; lower nodes emitting fascicles of long stout roots clothed with root-hairs; upper internodes very long, slender. Leaves 6–12 by $\frac{1}{4}$–$\frac{1}{2}$ in., linear, finely acuminate, soft, flat, glabrous, with smooth or scaberulous margins, base rounded or subcordate; sheaths 2–4 in. long, with smooth margins; ligule short, broad, membranous. Inflorescence a spike-like panicle 6–12 by $\frac{1}{4}$–$\frac{1}{3}$ in., cylindric, interrupted below; rhachis stout, strict, channelled. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. long, densely crowded in small fascicles, subsessile or shortly pedicellate, spreading, ovoid-lanceolate, acute, green. Glumes 4; lower invol.-glume scarcely $\frac{1}{10}$ in. long, broadly ovate, obtuse, hyaline, 3–5-nerved; upper invol.-glume ovate, acute, herbaceous, membranous, prominently 9-nerved; lower floral glume about equalling the upper invol.-glume, ovate, acute, 7-nerved, paleate, male or barren, the palea hyaline; upper floral glume shorter than the lower, ovate-oblong, subacute, thinly coriaceous, white, polished, dorsally convex, the palea thinly coriaceous, as large as the glume. Anthers purple, much exserted. Grain obovoid, apiculate. Fl. B. I. v. 7, p. 40; Dalz. & Gibs. p. 316; Trim. Fl. Ceyl. v. 5, p. 147; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1175.—Flowers: Oct.–Feb.

KONKAN: *Stocks*!, *Law*!; Pánvel, *Woodrow*; Vingorla, *Woodrow*; margins of tanks throughout the Konkan, *Dalzell & Gibson*. S. M. COUNTRY: Londa, *Woodrow*! SIND: *Woodrow*.—DISTRIB. Throughout India in swamps; Ceylon, Malaya, Trop. and S. Africa.

12. **Panicum myosuroides,** *R. Br. Prodr.* (1810) p. 189. Stem 2–3 ft. long, erect, or shortly creeping below, rather stout, leafy; internodes 3–5 in. long. Leaves 6–8 by $\frac{1}{10}$–$\frac{1}{6}$ in., narrowly linear, finely acuminate, margins smooth, base narrow; sheaths 2–4 in. long, with naked margins; ligule 0. Inflorescence a spike-like panicle $1\frac{1}{2}$–8 by $\frac{1}{6}$ in., cylindric, erect or curved; rhachis grooved, glabrous. Spikelets innumerable, $\frac{1}{12}$ in. long or less, densely crowded in small fascicles, very shortly pedicellate, globosely ovoid, obtuse, glabrous or pubescent, green or purplish. Glumes 4; lower invol.-glume about $\frac{1}{2}$ as long as the upper, ovate, subacute, 3-nerved; upper invol.-glume ovate, obtuse, conspicuously 5–9-nerved, glabrous or pubescent; lower floral glume about equalling the upper invol.-glume, but broader, ovate, obtuse, very concave, 5–9-nerved, glabrous or pubescent, paleate, empty; upper floral

glume much smaller than the lower, ovate-oblong, acute, quite smooth, white, dorsally convex with involute margins, thinly coriaceous; palea as long as the glume. Fl. B. I. v. 7, p. 42; Trim. Fl. Ceyl. v. 5, p. 148; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1175.

KONKAN: Sávantvádi, *Woodrow*; Alibag, *Lisboa*.—DISTRIB. Throughout the hotter parts of India; Ceylon, Malay Peninsula, China, Australia, Trop. Africa.

13. **Panicum turgidum,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 18. Perennial, glabrous, glaucous; rootstock sometimes as thick as the little finger; root-fibres thick, velvety; stem hard (bamboo-like), solid, smooth and polished, $\frac{1}{10}$–$\frac{1}{5}$ in. in diam. about the middle, emitting from the nodes fascicles of branches in tufts from a swollen base. Leaves few, those at the base of the stem and branches 1–3 in. long, flat, coriaceous, linear-lanceolate, acuminate, smooth, those of the upper nodes often reduced to open chartaceous sheaths with a setiform blade. Panicle terminal, subpyramidal, 1½–4 in. long; branches at first erect, then more or less spreading, ½–1½ in. long; rhachis angular, grooved, glabrous. Spikelets ⅛–¼ in. long, solitary, or rarely 2-nate, subsecund, ovoid, turgid, glabrous, white; pedicels short or long, with a cupular tip, scaberulous. Glumes 4, subcoriaceous; lower invol.-glume scarcely shorter than the upper, and about equalling the lower floral glume, broadly ovate, acute, concave, 5–7-nerved; upper invol.-glume broadly ovate, acute, 7-nerved; lower floral glume ovate, acuminate, 9-nerved, paleate, male; upper floral glume much smaller than the lower, ovate-oblong, acute, smooth, polished. Anthers purple. Styles short; stigmas short, pale purple. Fl. B. I. v. 7, p. 44; Delile, Fl. d'Egypte, p. 19, t. 9, fig. 2; Duthie, Fodd. Grass. N. Ind. p. 13; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.—Flowers: Nov. The plant grows on arid or desert plains.

GUJARAT: Rajkot (Kathiawar), *Woodrow*. SIND: *Duthie*.—DISTRIB. Beluchistan, Egypt, Arabia, Trop. Africa.

14. **Panicum obscurans,** *Woodr. in Journ. Bomb. Nat.* v. 13 (1901) p. 434. Annual; stems tufted, erect or ascending, 1–2 ft. (or more) high (in specimens raised from seed by Woodrow at Poona, in the College of Science Botanical Garden, the stem is simple and about 3 ft. high); nodes glabrous. Leaves 3½–5 by ⅜ in. at the widest part, lanceolate, acute, with a few scattered hairs above, hispid with bulbous-based hairs below; sheaths closely striate, hispid with short bulbous-based hairs, the margins naked; ligule a tuft of hairs. Panicle large, 15 by 12 in., pyramidal, lax; branches of the panicle widely spreading, laxly racemosely or subpaniculately branched, each branchlet 1–3-flowered at the apex, naked below; rhachis angular, grooved, scaberulous on the angles. Spikelets distant, solitary, ⅛–⅕ in. long, pedicellate, narrowly ovoid, acuminate. Glumes 4, the 3 lower strongly nerved with green nerves; lower invol.-glume ⅛ in. long, ovate, acuminate, shorter than the upper, membranous, 5-nerved, the nerves scaberulous; upper invol.-glume ⅛ in. long, ovate, acuminate, 7-nerved; lower floral glume rather less than ⅛ in. long, ovate, acuminate, empty, paleate, the palea ½ as long as the glume, elliptic-oblong, hyaline, shortly 2-dentate; upper floral glume $\frac{1}{10}$ in. long, crustaceous, hard, smooth, concave, elliptic,

obtuse, with incurved margins, yellowish-white, very faintly 5–7-nerved; the palea crustaceous, elliptic, obtuse, with incurved margins, as long as the glume. *Isachne obscurans*, Woodr. in Gard. Chron. v. 23, ser. 3 (1898) p. 161.—Flowers: Nov.–Dec. VERN. *Tán-sawa.* The whole inflorescence breaks off and is driven about by the wind (*Woodrow*).

DECCAN: Jeur near Sholapur, *Woodrow*! Specimens in Herb. Kew. also grown from seed in the Botanic Garden of the College of Science at Poona.

The grain is used as a fast-day food and cooked like rice (*Woodrow*).

15. **Panicum trypheron,** *Schult. Mantiss.* v. 2 (1824) p. 244. Annual; stems 1–3 ft. high, tufted, erect, or geniculate below, stout or slender, leafy at the base; nodes glabrous; internodes 2–5 in. long. Leaves 3–10 by $\frac{1}{8}$–$\frac{1}{4}$ in., usually flat, thin, linear, acuminate, more or less hairy on both surfaces, margins often ciliate, base narrow; sheaths long, glabrous or hairy, the margins often ciliate towards the top; ligule short, fimbriate. Panicle 4–10 in. long, often as broad as long, effuse; rhachis filiform, slightly scaberulous; branches up to 4 in. long, capillary. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, very distant, ovoid, acuminate, sometimes with a purple tinge, glabrous; pedicels long or short, filiform. Glumes 4; lower invol.-glume about $\frac{2}{3}$ as long as the lower floral glume, broadly ovate, acuminate, membranous, 5-nerved; upper invol.-glume slightly longer than the lower floral glume, ovate, acuminate, 7–9-nerved; lower floral glume similar but shorter, 7-nerved, empty, paleate, the palea oblong, obtuse, 2-toothed at the apex, smaller than the glume, hyaline; upper floral glume elliptic, obtuse, dorsally convex, smooth, shining, yellowish-white, coriaceous, faintly 5-nerved, the margin very slightly incurved, the palea elliptic, as long as the glume, coriaceous. Fl. B. I. v. 7, p. 47; Trim. Fl. Ceyl. v. 5, p. 152; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1176.—Flowers: Sept. VERN. *Bhatur.*

KONKAN: Malabar Hill (Bombay), *Lisboa.* DECCAN: Poona, *Woodrow*; Jeur (Sholapur districts), *Woodrow*; Malhargad, *Woodrow.*—DISTRIB. India (Bengal, Panjáb, W. Peninsula); Ceylon, China, Borneo, Trop. Africa.

16. **Panicum subeglume,** *Trin. in Mém. Acad. Pétersb.* sér. 6, v. 3, part 2 (1835) p. 292. Perennial; stem slender, 1–2 ft. long, glabrous or nearly so; nodes glabrous or tomentose. Leaves 3–6 by $\frac{1}{5}$–$\frac{3}{8}$ in., linear, finely acuminate, glabrous or softly hairy; sheaths glabrous or softly hairy; ligule short, membranous. Panicle large, effuse, 3–7 in. long, spreading; rhachis capillary; branches capillary, reaching 4 in. long, the lower suberect, alternate, often branched from the base; branchlets filiform. Spikelets pedicellate, $\frac{1}{10}$ in. long, oblong-ellipsoid, tapering to both ends, dorsally compressed, glabrous or silky. Invol.-glumes very minute, hyaline, sometimes one (rarely both) obsolete; lower floral glume 5–7-nerved, elliptic-oblong, subacute, glabrous or silky; upper floral glume as long as the lower, elliptic-oblong, acute, with membranous inflexed margins; palea oblong, subacute, slightly shorter than its glume, with membranous inflexed margins. I have found the two invol.-glumes present (though exceedingly minute) in many specimens that I have examined. Fl. B. I. v. 7, p. 51; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434. *Panicum Torreyanum*, W. & A. ex Steud. Nom. ed. 2, v. 2 (1841) p. 264.—Flowers: Sept.

S. M. COUNTRY: Badami, *Woodrow.*—DISTRIB. India (W. Peninsula).

17. **Panicum antidotale,** *Retz. Obs.* fasc. 4 (1786) p. 17. A tall glabrous perennial grass reaching 5 ft. high; rootstock creeping, stoloniferous; stem solid, woody, terete, smooth; nodes thickened, the lower sometimes rooting. Leaves 6–24 by $\frac{1}{4}$–$\frac{3}{4}$ in., linear, very finely acuminate with capillary tips; sheaths long, glabrous, striate, with naked margins; ligule short, membranous, jagged or fimbriate. Panicle 6–9 in. long, effuse, pyramidal; rhachis very slender, angular, glabrous or slightly scaberulous; branches usually fascicled (the upper sometimes solitary), 3–4 in. long, filiform, spreading and drooping; branchlets capillary. Spikelets laxly crowded on the branchlets, reaching $\frac{1}{8}$ in. long or slightly longer, ovoid, acute, glabrous. Glumes 4; lower invol.-glume $\frac{1}{2}$ as long as the upper, broadly ovate, subobtuse, 3-nerved, hyaline; upper invol.-glume broadly ovate, acuminate, 7–9-nerved, membranous; lower floral glume equal and similar to the upper invol.-glume, paleate, empty or male, the palea oblong, subacute, hyaline, as long as the glume; upper floral glume coriaceous, elliptic, obtuse, with incurved margins, dorsally smooth, yellowish-white; palea thinly coriaceous, ovate, acute, as long as the glume. Anthers linear-oblong. Styles 2, distinct, conspicuous, very plumose. Fl. B. I. v. 7, p. 52; Trim. Fl. Ceyl. v. 5, p. 156; Duthie, Indig. Fodd. Grass. t. 3; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.—Flowers: Mar.

S. M. Country: Londa, *Woodrow*. Gujarat: Kathiawar, *Woodrow*, 44! Sind: *Stocks*, 659!; Sukkur, *Woodrow*.—Distrib. India (Panjáb and upper Gangetic plain, W. Peninsula); Ceylon, Afghanistan, Trop. Africa and Australia.

18. **Panicum proliferum,** *Lam. Encyc. Méthod.* v. 4 (1797) p. 747. Var. **paludosum,** *Stapf, in Dyer, Fl. Capen.* v. 7 (1899) p. 407. Perennial; stem simple or branched, 2–3 ft. high, leafy, ascending from a creeping or floating spongy rootstock which is sometimes as thick as the little finger. Leaves 6–12 by $\frac{1}{4}$–$\frac{2}{3}$ in., linear or ensiform, acute or acuminate, flat, subcoriaceous, glabrous, base broad, subcordate; sheaths loose, glabrous, the margins naked; ligule a ridge of fine hairs. Panicle 4–10 in. long, often as broad as long when spreading, sessile at the mouth of the leaf-sheath or very shortly pedunculate; lower branches whorled and fascicled; rhachis stout, angular, scaberulous; branches of panicle strict, naked below, bearing short erect flowering branchlets about the middle. Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. long, narrowly ovoid-lanceolate, acuminate, greenish, solitary or 2-nate; pedicels angular, scaberulous. Glumes 4; lower invol.-glume not $\frac{1}{4}$ the length of the upper, orbicular or reniform, not nerved, hyaline; upper invol.-glume ovate, acuminate, 7-nerved, as long as the lower floral glume; lower floral glume similar, 9-nerved, paleate or not, empty (rarely male); upper floral glume shorter than the lower, oblong, acute, yellowish-white, smooth, shining, with incurved margins; palea as long as the glume, oblong, acute. Dr. Stapf (*l. c.*) states that the typical *P. proliferum* is only to be found in the Atlantic States of North America. *Panicum proliferum*, Hook. f. Fl. B. I. v. 7, p. 50; Trim. Fl. Ceyl. v. 5, p. 155; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1176. *Panicum paludosum*, Roxb. Fl. Ind. v. 1 (1832) p. 307. *P. decompositum* var. *paludosum*, Trim. Cat. p. 105.—Vern. *Borati*.

Konkan: Salsette, *Lisboa*. Deccan: Poona, *Lisboa*; Lanoli, *Lisboa*.—Distrib. Throughout the low countries of India in marshes and still waters; Ceylon, S. Africa, Tropics generally.

19. **Panicum montanum,** *Roxb. Fl. Ind.* v. 1 (1832) p. 313. Perennial; stem 3–4 ft. high (or more), erect from a woody rootstock, stiff, hard, solid, smooth, sparingly branched; nodes glabrous, the lower emitting long filiform roots. Leaves 5–7 by ½–1 in., spreading or deflexed from the sheath; linear-oblong, acuminate, flat, smooth, many-veined, glabrous or ciliate near the base only, with slender midrib and scaberulous margins, base broad, deeply cordate; sheaths shorter than the internodes, glabrous or pubescent, the margins naked or ciliate near the top; ligule of soft long hairs. Panicle 8–15 in. long, effuse, copiously branched; branches suberect or spreading, the lower branches very long; rhachis of panicle and the branches more or less scaberulous. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, ellipsoid, obtuse, solitary, distant; pedicels long, capillary, erect. Glumes 4; lower invol.-glume about ½ as long as the spikelet (or more), ovate, subacute, 3–5-nerved, with ciliate margins; upper invol.-glume broadly ovate, obtuse, 5-nerved, sometimes with ciliolate margins, subcoriaceous; lower floral glume slightly longer than the upper invol.-glume, broadly ovate, obtuse, 5-nerved, epaleate, subcoriaceous; upper floral glume elliptic, subacute, faintly striolate, coriaceous or almost crustaceous; palea nearly as long as the glume, elliptic, subacute, coriaceous, with inflexed membranous margins. Fl. B. I. v. 7, p. 53; Trim. Fl. Ceyl. v. 5, p. 155; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1176.—Flowers: Jan. VERN. *Tokarband.*

KONKAN: *Stocks!, Law!*; Khardi (Thána districts), *Lisboa.*—DISTRIB. Hotter parts of India; Ceylon, Penang, Malaya, China, Philippines.

20. **Panicum patens,** *Linn. Sp. Pl.* (1753) p. 58. Stem 1–2 feet long, very slender, branched, creeping and rooting below; nodes glabrous, the lower emitting long, solitary wiry roots. Leaves ¾–3½ by ¼–½ in., ovate-lanceolate or linear-lanceolate, finely acuminate, thin, glabrous or hairy; sheaths with ciliate margins and mouth; ligule membranous, rounded. Panicle 2–5 in. long, usually inclined, effuse or contracted; branches very slender, long, distant, naked below; branchlets capillary. Spikelets $\frac{1}{16}$ in. long, gibbously obovoid, obtuse, glabrous, laterally compressed, brown; pedicels long, capillary. Glumes 4; lower invol.-glume ½ as long as the spikelet, elliptic-oblong, obtuse, concave, membranous, brown; upper invol.-glume longer than the lower, but shorter than the floral glumes, gibbous, concave, keeled, membranous, brown; lower floral glume as long as the upper, elliptic, obtuse, concave, often ciliate at the tip, paleate, membranous, brown, empty, the palea small, hyaline, ovate-lanceolate, acuminate; upper floral glume glabrous, very gibbous, with a protuberant rounded back, boat-shaped, coriaceous, shortly stipitate, laterally compressed, white, shining; palea as long as the glume, elliptic with incurved margins. Fl. B. I. v. 7, p. 57; Trim. Fl. Ceyl. v. 5, p. 159; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434. *Panicum radicans,* Retz. Obs. fasc. 4 (1786) p. 18.—Flowers: Dec.

KANARA: Kadgal (N. Kanara), *Woodrow,* 32!—DISTRIB. India (Sikkim, Khasia Hills, W. Peninsula); Ceylon, Malay and Pacific Islands.

Panicum maximum, Jacq. Icon. Pl. Rar. v. 1 (1781) p. 2, t. 13. A tall perennial reaching 8–10 ft. high the first year, but after being cut two or three times it does not grow so high but grows thicker. The *Guinea Grass*, a native of Africa, cultivated as a fodder crop chiefly in Gujarat and Sind. Fl. B. I. v. 7, p. 49; Trim. Fl. Ceyl. v. 5, p. 153; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1176. *Panicum altissimum*, Brouss. Elench. Hort. Monsp. (1805) p. 42; Dalz. & Gibs. Suppl. p. 98. *P. jumentorum*, Pers. Syn. v. 1 (1805) p. 83; Duthie, Fodd. Grass. N. Ind. (1888) p. 9; Watt, Dict. Econ. Prod. v. 6, part 1, p. 10.

Panicum miliaceum, Linn. Sp. Pl. (1753) p. 58. An annual hairy grass 2–4 ft. high with leafy erect stem and a much-branched panicle, a native of Egypt and Arabia, is cultivated in many places in Gujarat and on the Ghâts for its grain which is eaten and a preparation of which constitutes a favorite food at marriage ceremonies. Fl. B. I. v. 7, p. 45; Grah. Cat. p. 237; Dalz. & Gibs. Suppl. p. 98; Duthie, Fodd. Grass. N. Ind. (1888) p. 9; Trim. Fl. Ceyl. v. 5, p. 150; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1176; Watt, Dict. Econ. Prod. v. 6, part 1, p. 12.—VERN. *Vârai*; *Ghoti-sâva*.

Panicum miliare, Lamk. Illust. v. 1 (1791) p. 173. Annual; stems many, 1–3 ft. high, erect, leafy; leaves smooth, linear, finely acuminate, glabrous or nearly so. Cultivated occasionally but not largely, in Gujarat and other parts of the Bombay Presidency. The grain, which becomes dark brown when ripe, is eaten by the poorer classes. Fl. B. I. v. 7, p. 46; Grah. Cat. p. 237; Duthie, Fodd. Grass. N. Ind. (1888) p. 10; Trim. Fl. Ceyl. v. 5, p. 150; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1176; Watt, Dict. Econ. Prod. v. 6, part 1, p. 13. *Panicum psilopodium*, Trin. Gram. Pan. Diss. 2 (1826) p. 217; Hook. f. Fl. B. I. v. 7, p. 46; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.—VERN. *Sâva*.

Panicum muticum, Forsk. Fl. Ægypt.-Arab. (1775) p. 20. A tall grass; stem 6–8 ft. high with bearded nodes; leaves 6–10 by $\frac{1}{2}$–$\frac{2}{3}$ in. with subcordate base; panicle 3–8 in. long. The *Water-Grass* and *Mauritius Grass* of Ceylon, a native of S. America, has been occasionally cultivated according to Woodrow at Kirkee and Surat. It is a valuable fodder grass and has been largely grown in Ceylon. Fl. B. I. v. 7, p. 34; Trim. Fl. Ceyl. v. 5, p. 140; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1175.

EXCLUDED SPECIES.

PANICUM AURITUM, *P. INDICUM*, *P. NODOSUM*, and *P. TRIGONUM* are given in Woodrow's list (Journ. Bomb. Nat. v. 13) as occurring in the Bombay Presidency, but no localities have been assigned as their habitat. There are no specimens of these from the Bombay Presidency in Herb. Kew. and there is not at present any evidence to show that they exist in that Presidency.

11. **DIGITARIA,** Rich.

Annual or perennial grasses. Leaves linear or lanceolate. Spikelets usually 2–3-nate, in digitate or racemose spikes, jointed on the pedicel but not thickened at the base; lower floret barren, reduced to the floral glume and a very minute palea; upper floret hermaphrodite. Glumes very dissimilar, normally 4; the lower invol.-glume usually hyaline, sometimes absent or present in the same species; the upper invol.-glume membranous, 1–5-nerved or nerveless; floral glumes equal or subequal, the lower like the upper invol.-glume, usually 7–9-nerved, the nerves close, parallel, straight, prominent; upper floral glume chartaceous or subchartaceous, usually 3-nerved. Palea of upper floret subequal to the glume, and of same texture, 2-nerved. Lodicules 2, minute, broadly cuneate. Stamens 3. Styles distinct; stigmas plumose, laterally exserted near the apex of the floret. Grain oblong, slightly dorsally compressed, free, but tightly enclosed between the hardened glume and the palea.—DISTRIB. Species about 50, mostly in warm parts of the Old World; 1 species widely spread as a weed all over the globe except the arctic regions.

Spikelets $\frac{1}{10}$ in. long or longer.	
Spikelets with clavate hairs	1. *D. ternata.*
Hairs on the spikelets not clavate.	
Spikelets bearded; spikes few	2. *D. sanguinalis* var. *ciliaris.*
Spikelets subsilky; spikes many	3. *D. pennata.*
Spikelets less than $\frac{1}{10}$ in. long.	
Rhachis capillary, trigonous	4. *D. pedicellaris.*
Rhachis narrowly winged.	
Spikelets subsilky with slender (not clavellate) hairs	5. *D. longiflora.*
Spikelets with clavellate hairs	6. *D. Royleana.*

1. **Digitaria ternata,** *Stapf, in Dyer, Fl. Capen.* v. 7 (1898) p. 376. Annual; stems tufted, erect from a geniculate base, slender, 6–18 in. long, glabrous or nearly so. Leaves 2–6 by $\frac{1}{4}$ in., linear-lanceolate, acute, glabrous; sheaths glabrous, striate, the mouth ciliate; ligules short, truncate, membranous. Spikes 2–3 (or more), subdigitate, erect or spreading, silvery-white; rhachis narrowly winged. Spikelets 2–3-nate, $\frac{1}{8}$ in. long, elliptic, subacute, closely appressed to the rhachis, pale; pedicels unequal, up to $\frac{1}{10}$ in. long, shortly hairy towards the tips. Lower invol.-glume usually obsolete; upper invol.-glume tender, 3-nerved, the sides villous with clavate hairs; floral glumes subequal, the lower prominently 5-nerved, densely and appressedly silky-villous with clavate hairs, the upper chartaceous, ovate-oblong, subacute, dark brown (nearly black). *Paspalum ternatum,* Hook. f. Fl. B. I. v. 7 (1896) p. 17; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.

S. M. COUNTRY: Belgaum, *Ritchie* !—DISTRIB. India (Khasia Hills); Abyssinia.

2. **Digitaria sanguinalis,** *Scop. Fl. Carn.* ed. 2, v. 1 (1772) p. 52. VAR. **ciliaris,** *Prain, Beng. Pl.* p. 1181. Annual; stems tall, reaching 3 ft. long or more, slender, ascending from a geniculate or prostrate branched base, glabrous. Leaves 2–6 by $\frac{1}{6}$–$\frac{1}{3}$ in., linear or linear-lanceolate, acute, flat, with scabrous margins, glabrous or more or less sparsely hairy; sheaths long, loose, glabrous, or rarely hairy except near the mouth. Spikes few (3–8), 3–6 in. long; rhachis slender,

triquetrous, narrowly winged. Spikelets oblong, acute, $\frac{1}{10}$–$\frac{1}{8}$ in. long, bearded; pedicels twin, one short, the other much longer, triquetrous with scabrid margins. Glumes 4; the lower invol.-glume a minute scale; the upper invol.-glume about $\frac{1}{2}$ as long as the lower floral glume, membranous; the lower floral glume ovate-oblong, acute, membranous, 3–5-nerved; the upper floral glume as long, subchartaceous. *Paspalum sanguinale* var. *ciliaris*, Hook. f. Fl. B. I. v. 7, p. 15. *Paspalum ciliare*, DC. Fl. Fr. ed. 3, v. 6 (1815) p. 250. *Panicum ciliare*, Retz. Obs. fasc. 4 (1786) p. 16; Grah. Cat. p. 237. *Panicum sanguinale* var. *ciliaris*, Watt, Dict. Econ. Prod. v. 6, part 1, p. 15.—Flowers: Oct. VERN. *Roeya*; *Dinohi*.

Throughout the Presidency, common.—DISTRIB. Most warm countries.

3. **Digitaria pennata,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 16 (*Paspalum*). Stems 2 ft. long, tufted, leafy. Leaves 1–6 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear or linear-lanceolate, finely acuminate, glabrous or sparsely hairy, distantly ciliate with long, fine, bulbous-based hairs; sheaths long, striate, glabrous or with a few scattered hairs; ligule long, oblong, membranous. Spikes several, radiating, 3–6 in. long; rhachis very slender, trigonous, with numerous long cilia. Spikelets erect, solitary or 2-nate, $\frac{1}{8}$ in. long, narrowly lanceolate, acute, subsilky. Glumes normally 4; lower invol.-glume minute, ovate, acute (rarely absent); upper invol.-glume lanceolate, acute, membranous; lower floral glume similar to the upper invol.-glume, 3–5-nerved; upper floral glume chartaceous, lanceolate, acuminate, nearly equal to the lower. *Paspalum pennatum*, Hook. f. *l. c.*; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.—Flowers: Oct.

GUJARAT: Morvi (Kathiawar), *Beck* ex *Woodrow*. SIND: Jemadar ka Landa near Karachi, *Stocks*, 1183!—DISTRIB. Beluchistan, Abyssinia.

4. **Digitaria pedicellaris,** *Prain, Beng. Pl.* (1903) p. 1181. Stems tufted, 6–18 in. long, leafy. Leaves 2–6 by $\frac{1}{10}$–$\frac{1}{8}$ in., linear-lanceolate, finely acuminate. Spikes 3–10, alternate, racemosely arranged on a very slender peduncle, suberect or spreading, 1–4 in. long; rhachis capillary, trigonous; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long, those of the upper spikelet longer than the spikelet. Spikelets 2–5-nate, $\frac{1}{20}$–$\frac{1}{10}$ in. long, elliptic, acute. Lower invol.-glume obsolete; upper invol.-glume elliptic, acute, very slightly hairy, 5-nerved, thinly membranous (almost hyaline); lower floral glume similar; upper floral glume elliptic, acuminate, thickly membranous, pale. *Paspalum pedicellare*, Trin. ex Steud. Nom. ed. 2 (1841) p. 272; Hook. f. Fl. B. I. v. 7 (1896) p. 19; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.

KONKAN: *Stocks*!—DISTRIB. Throughout India.

5. **Digitaria longiflora,** *Pers. Syn.* v. 1 (1805) p. 85 (*not* of Trin.). Annual or perennial; stems many, tufted, slender, creeping and rooting, or ascending or suberect, 6–18 in. long, glabrous, with many nodes, often branched, leafy. Leaves $\frac{1}{2}$–4 in. long, linear-lanceolate, acute, spreading, flat, or, in short-leaved states, stiff and pungent, glabrous (rarely hairy); sheaths smooth or hairy; ligule very short, membranous. Spikes 2–5, terminal, very slender, 1–4 in. long, erect or spreading; rhachis narrowly winged, glabrous; pedicels 2 (rarely 3)-nate, unequal,

short. Spikelets $\frac{1}{20}$–$\frac{1}{16}$ in. long, appressed to the rhachis, elliptic, obtuse, acute or subacute, pale or purplish, glabrous, or subsilky with wrinkled hairs. Lower invol.-glume 0 or rudimentary; upper invol.-glume 3–7-nerved; lower floral glume similar and subequal to the upper invol.-glume, 3–5-nerved; upper floral glume subchartaceous, ovate-oblong, slightly shorter than the lower, pale brown, smooth; palea with inflexed (not auricled) flaps. Prain, Beng. Pl. p. 1181. *Digitaria tenuiflora*, Beauv. Agrost. (1812) p. 51. *Paspalum longiflorum*, Retz. Obs. fasc. 4 (1786) p. 15; Hook. f. Fl. B. I. v. 7, p. 17; Trim. Fl. Ceyl. v. 5, p. 124; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.

Throughout the Presidency, but not common.—DISTRIB. Throughout India; Ceylon, tropical and subtropical regions of the Old World.

6. **Digitaria Royleana,** *Prain, Beng. Pl.* (1903) p. 1181. Perennial; stems 1–2 ft. long, tufted, slender, erect, leafy. Leaves 4–9 by $\frac{1}{8}$–$\frac{1}{4}$ in., erect, linear, acuminate, flat, glabrous or sparsely ciliate towards the base; sheaths glabrous or with a few scattered hairs; ligule short, rounded, membranous. Spikes 3–15, erect, subdigitate or alternate, 3–6 in. long, on the top of a slender peduncle, very slender; rhachis filiform, very narrowly winged, glabrous; pedicels often much longer than the spikelets, usually setulose with long hairs. Spikelets secund, $\frac{1}{20}$–$\frac{1}{16}$ in. long, broadly elliptic, tomentose with minute clavellate hairs. Lower invol.-glume 0 or reduced to a tuft of hairs; upper invol.-glume usually much smaller than the floral glumes or reduced to hairs; lower floral glume thinly membranous, broadly elliptic, strongly 5-nerved, as long as and broader than the upper floral glume; upper floral glume thinly coriaceous, ovate, acute, striolate, polished and shining, dark brown or nearly black; palea with inflexed flaps. *Paspalum Royleanum*, Nees, ex Thw. Enum. (1864) p. 358; Hook. f. Fl. B. I. v. 7, p. 18; Trim. Fl. Ceyl. v. 5, p. 125; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.—Flowers: Dec.

Western Ghâts (Suvasni Ghât), *Woodrow*!—DISTRIB. Hilly districts throughout India; Ceylon, Trop. Africa.

12. PASPALUM, Linn.

Annual or perennial grasses. Leaves lanceolate or ovate-lanceolate. Spikelets orbicular to oblong, obtuse, 1-flowered, awnless, falling off entire from the very short or obscure pedicels, secund and generally 2-ranked on the flattened or triquetrous rhachis of spikes, plano-convex; lower floret barren, reduced to the floral glume; upper floret hermaphrodite. Glumes 3; lower invol.-glume 0; upper invol.-glume membranous, as long as the floral glume (rarely shorter or obsolete). Floral glumes equal or subequal; the lower resembling the upper invol.-glume; the upper chartaceous to subcoriaceous. Palea subequal to and of the same texture as the upper floral glume. Lodicules 2, connate. Stamens 3. Styles distinct, slender; stigmas plumose, exserted from near the top of the spikelet. Grain tightly enclosed in the hardened floral glume and palea, dorsally subcompressed.—DISTRIB. Species about 150, chiefly natives of the New World.

Annual.

Leaves 6–18 by $\frac{1}{12}$–$\frac{1}{3}$ in.; a tall plant 2–3 ft. high	1. *P. scrobiculatum.*
Leaves 1–3 by $\frac{1}{3}$–$\frac{1}{2}$ in.; plant 6–12 in. high	2. *P. compactum.*
Perennial; leaves 2–4 by $\frac{1}{20}$–$\frac{1}{8}$ in.	3. *P. distichum.*

1. **Paspalum scrobiculatum,** *Linn. Mantiss.* (1767) p. 29. Annual; stems 2–3 ft. long, tufted on a very short rhizome, erect (rarely ascending), leafy from the base upwards, glabrous. Leaves bifarious, erect or suberect, 6–18 by $\frac{1}{12}$–$\frac{1}{8}$ in., finely acuminate, glabrous or sometimes softly hairy; sheaths 4–8 in. long, compressed, loose, the mouth hairy, with very short membranous ligules. Spikes 2–6, sessile, usually distant and spreading, 1–6 in. long; rhachis herbaceous, $\frac{1}{12}$–$\frac{1}{8}$ in. broad with ciliate margins. Spikelets usually 2-ranked, $\frac{1}{12}$–$\frac{1}{8}$ in. in diam., sessile or shortly pedicellate, broadly elliptic or suborbicular, imbricate. Glumes 3; lower invol.-glume 0; the upper convex, 3–7-nerved, membranous; lower floral glume flat, membranous, like the upper invol.-glume; upper floral glume thickly coriaceous, brownish, shining, striolate; palea orbicular, tumid, thickly coriaceous like the upper floral glume, dorsally convex, ventrally strongly inflexed below the middle and forming 2 broad membranous auricles that embrace the grain. Fl. B. I. v. 7, p. 10; Grah. Cat. p. 234; Dalz. & Gibs. Suppl. p. 97; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1182; Watt, Dict. Econ. Prod. v. 6, part 1, p. 111. *Paspalum Kora*, Willd. Sp. Pl. v. 1 (1797) p. 332; Grah. Cat. p. 234.—Flowers: Oct. VERN. *Harik.*

Throughout the Presidency, cultivated.—DISTRIB. Tropics of the Old World.

The grain is eaten by the poorer natives, but its use requires care and considerable preparation, as in some cases the grain is poisonous and produces unconsciousness or delirium with violent tremors of the voluntary muscles. See Watt, Dict. Econ. Prod. l. c.

2. **Paspalum compactum,** *Roth, Nov. Pl. Sp.* (1821) p. 36. Plant 6–12 in. high; roots stiff, wiry; stems terete, decumbent and branched below, leafy, hairy. Leaves 1–3 by $\frac{1}{8}$–$\frac{1}{2}$ in., elliptic-lanceolate, acute, sparsely hairy on both sides, ciliate; sheaths densely hairy with fine bulbous-based hairs; ligule very short. Spikes numerous, shorter upwards, spreading (often nearly horizontally), glabrous or nearly so, forming a pyramidal raceme 2–4 in. long; rhachis slender, triquetrous. Spikelets $\frac{1}{20}$–$\frac{1}{16}$ in. in diam., hemispheric, rather turgid, close-set but not imbricate, pendulous by short filiform pedicels. Lower invol.-glume 0; upper invol.-glume broadly elliptic or suborbicular; lower floral glume narrower; upper floral glume subcoriaceous, concave, orbicular, rounded at the tip, white; palea not or obscurely auricled. Fl. B. I. v. 7, p. 12; Steud. Syn. Gram. (1855) p. 31; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433.—Flowers: Sept. VERN. *Kuri.*

KONKAN: *Stocks!* DECCAN: Lanoli, *Lisboa, Woodrow*; Mahableshwar, *Cooke!, Woodrow.* KANARA: *Woodrow.*—DISTRIB. India (W. Peninsula).

3. **Paspalum distichum,** *Linn. Amœn. Acad.* v. 5 (1760) p. 391. Perennial; stem many-noded, sheathed throughout, ascending from a creeping, rooting, often very long and branched base. Leaves numerous, distichous, 2–4 by $\frac{1}{20}$–$\frac{1}{6}$ in., linear-lanceolate, acuminate, involute or flat, spreading, membranous, or, in short-leaved states, stiff and pungent, glabrous or nearly so; sheaths thin, glabrous except the usually bearded mouth; ligules very short, truncate. Spikes 2-nate, shortly pedunculate and articulate on the top of the stem; rhachis herbaceous, $\frac{1}{20}$ in. broad. Spikelets subsessile, solitary or 2-nate, elliptic-oblong, $\frac{1}{12}$–$\frac{1}{6}$ in. long, acute, dorsally flattened, imbricate and appressed to the rhachis,

glabrous, pale. Lower invol.-glume 0; upper invol.-glume membranous, with a scarcely evident midnerve; lower floral glume like the upper invol.-glume with a distinct midnerve; upper floral glume shorter, elliptic, concave, acuminate, subcoriaceous, smooth, nearly white; palea not or obscurely auricled. Anthers $\frac{1}{20}$—$\frac{1}{16}$ in. long. Fl. B. I. v. 7, p. 12; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1182. *Paspalum longiflorum*, Beauv. Fl. d'Owar. v. 2 (1809) p. 46, t. 85 (*not* of Retz.); Grah. Cat. p. 234.—Flowers: Oct.

KONKAN: Sea-shore, Bombay, *Woodrow*; Malwán, *Woodrow*.—DISTRIB. India (Sundribans, W. Peninsula, Andamans); Malacca.

13. **ERIOCHLOA,** H. B. & K.

Annual or perennial grasses. Leaves flat, lanceolate or ovate-lanceolate. Spikelets 1-flowered, aristulate, secund on the spiciform branches of a raceme or panicle, the base thickened and articulate on the thickened apex of the short pedicel. Glumes 3; lower invol.-glume (of *Panicum* &c.) absent; upper invol.-glume subequal to the lower floral glume; upper floral glume paleate, rather shorter than the lower, apiculate, hardening in fruit. Lodicules truncate. Stamens 3; anthers linear. Styles 2, free; stigmas plumose, subapically exserted. Grain oblong, free between the hardened glume and the palea.—DISTRIB. Species few, tropical.

1. **Eriochloa polystachya,** *H. B. & K. Nov. Gen. & Sp.* v. 1 (1815) p. 95, t. 31. Perennial, densely tufted, 2–5 ft. high; rootstock short, creeping; stems leafy, ascending from a creeping base, stout or slender, simple or branched, glabrous except the nodes. Leaves 3–8 by $\frac{1}{6}$–$\frac{1}{5}$ in., linear or linear-lanceolate, acuminate, glabrous; sheaths glabrous, ligule a villous ridge. Panicles 2–5 in. long; peduncles long or short; rhachis slender, angular, smooth; branches of panicle (spikes) alternate, 1–2 in. long, suberect, angular. Spikelets silvery, $\frac{1}{8}$–$\frac{1}{6}$ in. long, loosely imbricate, shortly pedicellate, distichous, solitary or 2-nate, elliptic-lanceolate, acuminate. Lower invol.-glume 0; upper invol.-glume oblong-lanceolate, acuminate, obscurely 3-nerved, silky-hairy, membranous; lower floral glume similar to the upper invol.-glume; upper floral glume much shorter than the lower, elliptic-oblong, obtuse, apiculate, thinly coriaceous, pale, shining; palea oblong with incurved margins. Anthers linear. Grain oblong, free within the hardened glume and palea. Fl. B. I. v. 7, p. 20; Trim. Fl. Ceyl. v. 5, p. 126; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 433; Prain, Beng. Pl. p. 1183. *Eriochloa annulata*, Kunth, Revis. Gram. v. 1 (1829) p. 30; Watt, Dict. Econ. Prod. v. 3, p. 257.—Flowers: Oct.

KONKAN: Bombay near Mahim, *Woodrow, Lisboa*. KANARA: N. Kanara, *Lisboa*.—DISTRIB. Throughout India; Ceylon, most hot countries.

14. **DIMERIA,** R. Br.

Erect slender, annual or perennial grasses. Leaves narrow. Inflorescence of solitary or 2-nate or digitate slender racemes bearing many spikelets; rhachis of racemes inarticulate, terete, angular or flattened. Spikelets 1-flowered, articulate, subsessile or on very short pedicels, laterally much compressed, solitary, secund, bifarious, 2-sexual.

Glumes 4; invol.-glumes usually divaricate in flower, empty; lower invol.-glume coriaceous, linear, with complicate sides, dorsally rounded; upper invol.-glume as long as or longer than the lower one, chartaceous, oblong, with hyaline margins and complicate sides, dorsally keeled, the keel sometimes winged; lower floral glume shorter than the upper invol.-glume, linear or oblanceolate, empty, epaleate; upper floral glume hyaline, complicate, oblong, 2-fid, awned in the sinus, the awn capillary with a short column; palea minute or 0. Lodicules 0 or very minute. Stamens 2; anthers long or short. Styles short; stigmas short, laterally exserted. Grain linear, compressed.—DISTRIB. Tropical Asia and Australia; species 18.

Racemes 2-3-nate; annuals.
Rhachis nearly straight; awn long ..... 1. *D. ornithopoda.*
Rhachis circinately curved; awn short ..... 2. *D. Woodrowii.*
Racemes many-nate; a perennial grass ..... 3. *D. gracilis.*

1. **Dimeria ornithopoda,** *Trin. Fund. Agrost.* (1820) p. 167, t. 14. A slender annual tufted leafy grass 6–20 in. high. Leaves 1–3 by $\frac{1}{10}$–$\frac{1}{8}$ in., erect, linear, finely acuminate; sheaths usually glabrous. Racemes 2 (rarely 3), very slender, 1–2 in. long; rhachis flexuous, stout, angular. Spikelets about $\frac{1}{10}$ in. long, sessile or subsessile, linear, acuminate; callus villous with short white hairs. Glumes 4; lower invol.-glume slender, linear, acute, $\frac{1}{10}$ in. long, slightly pubescent or nearly glabrous; upper invol.-glume slightly longer than the lower one, linear, acuminate, with hyaline margins, pubescent on the back; lower floral glume $\frac{1}{12}$ in. long, linear, acute; upper floral glume $\frac{1}{16}$ in. long, hyaline; awn nearly $\frac{1}{3}$ in. long, the column $\frac{1}{8}$ in. long, brown, the upper part white, capillary. Fl. B. I. v. 7, p. 104; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1187. *Psilostachys filiformis,* Dalz. in Dalz. & Gibs. Bo. Fl. (1861) p. 305.—Flowers: Oct. VERN. *Khâp-kurdi.*

KONKAN: Mahableshwar, *Dalzell & Gibson, Lisboa*; Panchgani, *Woodrow*; Khandala, *Woodrow*; Lanoli, *Lisboa.* KANARA: Jagalbet (N. Kanara), *Talbot,* 1565! —DISTRIB. Throughout India; Malay Islands, Japan, Tropical Australia.

2. **Dimeria Woodrowii,** *Stapf, in Hook. Icon. Pl.* v. 24 (1895) t. 2312. Annual, 3–6 in. high; stem slender, leafy, more or less branched; nodes pubescent; upper internode (or peduncle) with its leaf abruptly deflexed after flowering. Leaves 1½–3 by $\frac{1}{16}$–$\frac{1}{10}$ in., linear, finely acuminate, 3-nerved, with a strong midnerve, glabrous or nearly so; sheaths glabrous; ligule very short, hyaline. Racemes ¾–1 in. long, geminate, at first erect, then circinately incurved, glabrous; rhachis trigonous, subundulate; internodes shorter than the spikelets; pedicels distinct, about $\frac{1}{40}$ in. long. Spikelets $\frac{1}{8}$ in. long, sublinear, few, rather distant, suberect, diverging as the rhachis incurves; callus bearded. Glumes 4; lower invol.-glume rather more than $\frac{1}{8}$ in. long, linear, acute, folded, 1-nerved, glabrous or sparsely hairy; upper invol.-glume slightly longer than the lower one, broader, acute, narrowly keeled and thickened at the back, the margins hyaline; lower floral glume narrowly linear, hyaline, sometimes mucronulate; upper floral glume rather more than $\frac{1}{10}$ in. long, 2-fid, awned at the sinus, hyaline, the awn about $\frac{1}{8}$ in. long. Grain linear-lanceolate, compressed.

Fl. B. I. v. 7, p. 104; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436.—Flowers: Oct.

KONKAN: Ratnagiri, *Woodrow!*; Marmagão, *Talbot*, 2557!—DISTRIB. India (W. Peninsula).

3. **Dimeria gracilis,** *Nees, ex Steud. Syn. Gram.* (1855) p. 413. Perennial; stems densely tufted, 1–3 ft. high, leafy, stout or slender, rarely branched. Leaves 6–10 by $\frac{1}{8}$–$\frac{1}{6}$ in., erect, rigid, narrowly linear, finely acuminate, glabrous or pilose, base narrowed into the sheath; sheaths terete, not auricled at the mouth; ligule short, broad, membranous, ciliolate. Racemes 3–10, very slender, 3–5 in. long, pale brown, lax-flowered, flexuous; rhachis filiform, obtusely trigonous or subterete, glabrous. Spikelets $\frac{1}{8}$–$\frac{1}{4}$ in. long; pedicels long or short; callus very short; densely bearded. Glumes 4; lower invol.-glume $\frac{1}{6}$ in. long, linear, acute, plicate, more or less scaberulous; upper invol.-glume $\frac{1}{5}$ in. long, linear, acute, aristate, with hyaline ciliolate margins; lower floral glume obovate-oblong, ciliolate above the middle; upper floral glume $\frac{1}{10}$ in. long, linear-oblong, acutely 2-fid; awn $\frac{3}{8}$ in. long (or more), the lower third brown, the upper two-thirds white; palea minute, narrow, ciliate. Lodicules large, broadly cuneate. Fl. B. I. v. 7, p. 105; Trim. Fl. Ceyl. v. 5, p. 199; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436.—Flowers: Dec.

KONKAN: *Law!*, *Stocks!* DECCAN: *Woodrow*, 172!; Lanoli, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

15. **IMPERATA,** Cyrill.

Erect perennial grasses; stem leafy; internodes solid. Leaves narrow. Spikelets 1-flowered, in spike-like subcylindric silvery-silky panicles, with very short filiform inarticulate branches and rhachises, all alike and 2-sexual, narrow, terete, hidden among very long hairs arising from a small callus and from outer glumes, 2-nate, a sessile and a pedicellate one, articulate at the base, fugacious. Glumes 4; invol.-glumes subequal, membranous, dorsally rounded or the upper obscurely keeled, 3–5-nerved at the base; lower invol.-glume ovate-lanceolate with a hyaline obtuse tip; upper invol.-glume acuminate; floral glumes short, often erose; palea minute, hyaline. Lodicules 0. Stamens 1 or 2. Styles connate below; stigmas very long, narrow, exserted at the top of the spikelets. Grain small, oblong.—DISTRIB. Species 5, tropical, chiefly American; 2 Asiatic, one also European.

1. **Imperata arundinacea,** *Cyrill, Pl. Rar. Neap.* fasc. 2 (1792) p. 26, t. 11. Rootstock stoloniferous, often creeping; stem 1–3 ft. high, stout or slender; nodes naked or bearded. Leaves 6–18 by $\frac{1}{10}$–$\frac{1}{4}$ in., linear, flat, tapering from the middle to a finely acuminate point, smooth above, scaberulous beneath and on the margins; sheaths loose, glabrous; ligule of long soft hairs. Panicle 3–8 in. long, narrow, spike-like, subcylindric, silvery-white; branches short, crowded, appressed. Spikelets $\frac{1}{8}$ in. long, lanceolate; pedicels $\frac{1}{25}$–$\frac{1}{8}$ in. long; hairs of callus twice as long as the spikelet. Glumes 4; invol.-glumes ovate-lanceolate, subequal in length, obtuse or subobtuse, with ciliate tips, 3–7-nerved; lower floral glume less than $\frac{1}{2}$ as long as the invol.-glumes, oblong, obtuse, denticulate, ciliate, nerveless; upper floral glume ovate, glabrous, nerveless or with 1 faint nerve. Anthers $\frac{1}{10}$ *in. long*, orange. Stigmas

$\frac{1}{8}$–$\frac{1}{6}$ in. long, purple. Fl. B. I. v. 7, p. 106; Trim. Fl. Ceyl. v. 5, p. 200; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1188; Watt, Dict. Econ. Prod. v. 4, p. 336. *Saccharum cylindricum*, Lam. Encyc. Méthod. v. 1 (1783) p. 594; Grah. Cat. p. 239.

KANARA: *Law*! GUJARAT: *Law* ex *Graham*. SIND: *Stocks*!—DISTRIB. Throughout the hotter parts of India; Ceylon, most warm countries.

16. **SPODIOPOGON,** Trin.

Tall grasses. Leaves often with long petioles. Spikelets 1–2-flowered, paniculate, laterally compressed or subterete, 2–3-nate; lower sessile, male; upper 2-sexual; rhachis jointed. Glumes 4; invol.-glumes subequal; lower invol.-glume lanceolate, 5–9-nerved, with an acuminate or toothed tip; upper invol.-glume membranous, lanceolate, 3 7-nerved; lower floral glume hyaline, paleate or not, triandrous or empty; upper floral glume 2-fid or 2-partite, with a very slender exserted awn in the sinus; palea shorter than the glume. Lodicules cuneate. Anthers linear. Stigmas linear. Grain free, narrowly fusiform.—DISTRIB. Species about 5, Asiatic.

1. **Spodiopogon albidus,** *Benth. in Journ. Linn. Soc.* v. 19 (1881) p. 66. A weak straggling tufted annual grass 2–4 ft. high; stem slender, much-branched, leafy. Leaves 6–10 by $\frac{1}{4}$–$\frac{3}{4}$ in., oblong-lanceolate, acuminate, 1-nerved, usually suddenly narrowed into a slender petiole 1–3 in. long; sheaths $\frac{3}{5}$ in. long; ligule oblong, glabrous. Panicle at first enclosed in a long narrow spathaceous leaf-sheath; rhachis compressed, ciliate. Spikelets reaching $\frac{1}{4}$ in. long, lanceolate, silky-villous, one pedicellate, the other sessile; pedicels $\frac{1}{10}$ in. long, spathulate, flattened, ciliate. Glumes 4; invol.-glumes equal, ovate-lanceolate, finely mucronate, silky-hairy, 7-nerved; lower floral glume truncate, with erose tip, hyaline; upper floral glume $\frac{1}{8}$ in. long, deeply divided at the apex into 2 very acute lobes; awn reaching $\frac{1}{2}$ in. long, slender. Fl. B. I. v. 7, p. 108; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436. *Andropogon petiolatus*, Dalz. Bo. Fl. (1861) p. 303.—Flowers: Oct.

Dalzell without locality in Herb. Kew.! KONKAN: W. Ghâts, *Woodrow*, 157!; Matheran, *Cooke*!; Salsette, *Jacquemont*, 708! DECCAN: Lanoli, *Woodrow*; Mahableshwar, *Cooke*! KANARA: N. Kanara, *Talbot*, 279!—DISTRIB. India (Central Provinces, Rajputana, W. Peninsula).

17. **SACCHARUM,** Linn.

Perennial often very tall grasses. Leaves narrow, flat. Spikelets minute, awnless, 1-flowered, all similar, usually 2-nate (1 sessile, the other pedicellate), 2-sexual, articulate at the base, disposed in large silky much and densely branched panicles with spreading, at length erect, articulate capillary, usually fragile branches; sessile spikelets deciduous with the contiguous joint of the rhachis and pedicel; callus bearded with very long hairs. Glumes 4; lower invol.-glume about equal to the upper, oblong or lanceolate, dorsally flat or convex, with incurved or inflexed margins, 1–2-nerved at each flexure, keels not winged nor scaberulous; upper invol.-glume concave, dorsally rounded or obscurely keeled, 1–5-nerved; lower floral glumes hyaline, oblong; upper floral

glume smaller or 0, awnless; palea small, hyaline, nerveless or 0. Lodicules 2, cuneate or irregular. Stamens 3. Stigmas laterally exserted. Grain oblong or subglobose.—DISTRIB. Species about 12, tropical, chiefly Asiatic.

1. **Saccharum spontaneum,** *Linn. Mant.* (1771) p. 183. A tall erect grass reaching sometimes 20 ft. high; stem erect from a stout rootstock, solid, smooth, polished, silky beneath the panicle. Leaves 1–2½ ft. by ⅛–¼ in., narrowly linear, finely acuminate, rigid, coriaceous, usually glabrous, often with convolute margins; sheaths smooth, with fimbriate mouth; ligule ovate, membranous. Panicle 8–24 in. long, lanceolate, silky-hairy; rhachis slender; branches 3–5-nate, 2–4 in. long; rhachis of racemes almost capillary, fragile. Spikelets ⅛ in. long, lanceolate; callus minute, bearded with spreading silky hairs ½ in. long. Glumes 4; lower invol.-glume lanceolate-subulate, acuminate; upper invol.-glume equal to the lower, lanceolate, obscurely keeled, 1-nerved; lower floral glume ovate-lanceolate, subacute, ciliate, hyaline, nerveless; upper floral glume very slender, ciliate; palea minute, ciliate. Fl. B. I. v. 7, p. 118; Dalz. & Gibs. p. 304; Trim. Fl. Ceyl. v. 5, p. 201; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1188; Watt, Dict. Econ. Prod. v. 6, part 2, p. 11.—Flowers: Nov. VERN. *Bagheri*; *Kamis*; *Khair.*

KONKAN: *Stocks!*; Karjat, *Woodrow.* DECCAN: Poona (river-bank), *Woodrow!* S. M. COUNTRY: Belgaum, *Ritchie.* GUJARAT: Baroda, *Cooke!*; Domas (near Surat), *Dalzell & Gibson.* SIND: *Stocks*, 545!; Shikarpur, *Woodrow.*—DISTRIB. Throughout India; Ceylon, S. Europe and warm regions of the Old World, East Australia.

Saccharum arundinaceum, Retz. Obs. fasc. 4 (1786) p. 14. A tall strikingly handsome grass reaching, under favorable conditions, nearly 20 ft. high, with leaves 3–5 ft. by 1–3 in. with a conspicuous midrib. Panicle 1–2 ft. long, cream-colored, brown or purplish. Spikelets about ⅒ in. long, clothed with soft creamy or purplish woolly hairs. Fl. B. I. v. 7, p. 119; Trim. Fl. Ceyl. v. 5, p. 202; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1188; Watt, Dict. Econ. Prod. v. 6, part 2, p. 1. *Saccharum exaltatum,* Roxb. Fl. Ind. v. 1 (1832) p. 245; Grah. Cat. p. 239.

I cannot find any evidence that this plant is indigenous in the Bombay Presidency. The only specimens from Bombay in Herb. Kew. were collected by Woodrow from a Bombay garden, and Lisboa (Journ. Bomb. Nat. v. 6 (1891) p. 190) remarks that it has been seen only in cultivation in Bombay gardens, while Woodrow (*l. c.*) gives no habitat, merely noting it as "planted."

Saccharum officinarum, Linn. Sp. Pl. (1753) p. 54. *The Sugar Cane,* extensively cultivated in the Bombay Presidency and throughout the hotter parts of India. For a full account of the cultivation of the plant and the mode of extraction and refining of its sugar, see Watt, Dict. Econ. Prod. v. 6, part 2, pp. 3–380.—VERN. *Us.*

18. **ERIANTHUS**, Michx.

Tall perennial grasses. Leaves flat, narrow. Spikelets all similar, 2-nate (one sessile, the other pedicellate, very rarely both unequally pedicellate), 1-flowered, 2-sexual, on the articulate and usually fragile

rhachis of paniculate racemes (the sessile spikelets deciduous with the internode and pedicel); callus bearded with long hairs. Glumes 4; invol.-glumes subequal; lower invol.-glume oblong-lanceolate, dorsally flattened, more or less distinctly 2-keeled; upper invol.-glume 1–3-nerved, keeled; lower floral glume hyaline, oblong, muticous or mucronate; upper floral glume shortest, generally awned; palea small, hyaline, nerveless. Lodicules 2, cuneate. Stamens 2–3. Stigmas usually laterally exserted. Grain oblong or subglobose.—DISTRIB. Species about 20, mainly tropical.

Racemes panicled; leaves 2–3 ft. by 1–1½ in., scaberulous; sheaths hairy; callus with long silky hairs.	1. *E. Ravennæ.*
Racemes subdigitate; leaves 1–2 ft. by ⅛–¼ in., smooth; sheaths glabrous; hairs of callus short	2. *E. fastigiatus.*

1. **Erianthus Ravennæ,** *Beauv. Agrost.* (1812) p. 14. Stem 6–10 ft. high; nodes glabrous. Leaves 2–3 ft. by 1–1½ in., linear, scaberulous on both surfaces, flat, margins scabrid, midrib broad; sheaths hairy; ligule a narrow silky-hairy band. Panicles oblong, 1–3 ft. long, erect or inclined, clothed with silky hairs; branches many from the rhachis. Spikelets pale, ⅕ in. long (excluding awn), linear-lanceolate; pedicels with 2 opposite rows of very long silky hairs; callus short, with long silky hairs which are as long as or longer than the spikelet. Glumes 4; lower invol.-glume ⅕ in. long, membranous, lanceolate, aristately acuminate, with slightly scaberulous margins; upper invol.-glume slightly longer than the lower, lanceolate, aristately acuminate, obscurely 3-nerved; lower floral glume rather more than ⅕ in. long, narrowly lanceolate, very acute, with incurved margins, hyaline; upper floral glume $\frac{1}{10}$ in. long, ovate-lanceolate, tapering into a whitish awn of variable length. Fl. B. I. v. 7, p. 121; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436.—Flowers: Dec.

SIND: Larkhana, *Cooke*!; Karachi, *Cooke*!, *Woodrow*.—DISTRIB. India (W. Himalaya, Panjáb, Upper Gangetic plain, W. Peninsula); westward to the Mediterranean.

2. **Erianthus fastigiatus,** *Nees, ex Steud. Syn. Gram.* (1855) p. 409. Stem 2–8 ft. high, stout or slender, silky-hairy below the panicle. Leaves 1–2 by ⅛–¼ in., linear from a narrow base, rigid, flat, smooth, with scabrid margins; sheaths glabrous, with fimbriate mouth; ligule a narrow membrane. Panicle oblong or fan-shaped; racemes crowded, subdigitately fascicled; rhachis angular, silky-hairy. Spikelets ⅕ in. long, lanceolate, dark brown below, paler above; callus with white hairs which are much shorter than the spikelet; pedicels as long as the spikelets, with 2 opposite rows of silky hairs. Glumes 4; lower invol.-glume ⅕ in. long, chartaceous, brown, shining, ovate-lanceolate, acute, the margins near the base clothed with long silky hairs; upper invol.-glume chartaceous, lanceolate, acuminate, brown below, paler above, equalling the lower invol.-glume; lower floral glume ⅛ in. long, narrowly lanceolate, acute, base membranous, colored, the upper part hyaline; upper floral glume $\frac{1}{10}$ in. long, lanceolate, 2-toothed, hyaline, with a slender awn ¼ in. long or longer. Fl. B. I. v. 7, p. 125; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1189.

S. M. COUNTRY: Belgaum, *Ritchie*, 792!—DISTRIB. India (Sikkim, Khasia, Assam, Bengal, W. Peninsula).

19. **POLLINIA,** Trin.

Annual or perennial grasses of various habit. Leaves usually narrow. Spikelets all alike or nearly so, 3-nate (one sessile, the other pedicellate, rarely both pedicellate) on the articulate and usually fragile rhachis of 2-nate, digitate or fascicled spike-like racemes; callus short, bearded. Glumes 4; lower invol.-glume membranous, dorsally flattened or concave, more or less 2-keeled, with inflexed margins; upper invol.-glume membranous, keeled, 1–3-nerved, with inflexed margins; lower floral glume hyaline, paleate or not, sometimes suppressed; upper floral glume short, hyaline, 2-lobed or entire, generally awned; palea small or 0. Lodicules 2, small, cuneate. Stamens 3 (rarely 2). Styles short; stigmas linear, laterally exserted. Grain oblong.—DISTRIB. Species about 32, in tropical and subtropical regions of the Old World.

Racemes many, 6–12; perennial ..... 1. *P. argentea.*
Racemes few, 2–4; annual..... 2. *P. fimbriata.*

1. **Pollinia argentea,** *Trin. in Bull. Sc. Acad. Pétersb.* v. 1 (1836) p. 71. Perennial; stems tufted, 1½–4 ft. high, stout or slender, erect, simple or branched, smooth, shining, leafy at the base and upwards; nodes glabrous. Leaves 6–18 by $\frac{1}{20}$–$\frac{1}{5}$ in., erect, narrowly linear, rigid, often filiform, glabrous, striate, tips capillary; sheaths long, slender, coriaceous, not auricled at the mouth, the sides bearded with long hairs; ligule a short membrane fringed with long hairs. Racemes 6–12, narrow, 1–6 in. long, lax-flowered; rhachis firm, flexuous, compressed; pedicels of spikelets flattened, slightly dilated at the apex, densely silky-villous on the edges. Spikelets $\frac{1}{6}$ in. long (excluding the long awn). Glumes 4; lower invol.-glume linear-oblong, crustaceous below, membranous above with a hyaline tip, silky villous on the back, the margins narrowly incurved, villous with long silky hairs; upper invol.-glume oblong, 1-nerved, tip erose, margins incurved, ciliate; lower floral glume $\frac{1}{8}$ in. long, narrowly oblong, hyaline, flat, nerveless; upper floral glume shorter than the upper invol.-glume, linear-oblong, cleft into 2 subulate lobes; palea 0; awn reaching $\frac{3}{4}$ in. long, not or scarcely ciliate, the lower half brown, twisted, the upper half white, straight. Fl. B. I. v. 7, p. 111; Trim. Fl. Ceyl. v. 5, p. 204; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1190.—Flowers: Oct.–Dec.

KONKAN: Ratnagiri, *Woodrow.* DECCAN: Máwal, *Woodrow,* 1!; Lanoli, *Woodrow, Lisboa.*—DISTRIB. Throughout India; Ceylon, Malaya, Australia.

2. **Pollinia fimbriata,** *Hack. Monogr. Androp. in DC. Monog. Phan.* v. 6 (1889) p. 164. Annual; stem 1–2 ft. long; internodes much longer than the sheaths; nodes glabrous. Leaves 6–10 by $\frac{1}{6}$ in., flaccid, sparsely hairy above; sheaths glabrous; ligule a ciliolate ridge. Racemes 2–4, villous with white hairs, 1–3 in. long, flexuous, pale, with long peduncles; rhachis slender, silky-hairy; pedicels of spikelets with 2 opposite rows of dense silky hairs. Spikelets $\frac{1}{8}$ in. long; callus very short, silky-villous with long white hairs. Glumes 4; lower invol.-glume elliptic-lanceolate, with villous keels above, 2-toothed; upper invol.-glume as long as the lower, elliptic, obtuse, with incurved ciliate margins; lower floral glume $\frac{1}{8}$ in. long, narrowly oblong, obtuse, hyaline, ciliolate; upper floral glume $\frac{1}{10}$ in. long, hyaline, deeply 2-fid into 2

acute lobes; awn $\frac{1}{2}$–$\frac{3}{4}$ in. long, ciliate, the lower half brown, twisted, the upper half white; palea minute or 0. Fl. B. I. v. 7, p. 112; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436.—Flowers: Oct.

KONKAN: *Law!*, *Stocks!* DECCAN: Lanoli, *Woodrow*, 173!—DISTRIB. India (W. Himalaya, W. Peninsula, Pegu).

20. **OPHIURUS,** Gærtn.

Annual or perennial tall grasses; stems solid, branching upwards, leafy. Leaves linear-lanceolate. Spikes solitary or fasciculate, terete, fragile; joints excavate, with concave tops. Spikelets 2-flowered, solitary and sessile in the joints, with no trace of an upper spikelet and no awn. Glumes 4; lower invol.-glume thickly coriaceous, convex, obtuse; upper invol.-glume membranous, concave, keeled; lower floral glume elliptic, obtuse, hyaline, faintly 2-nerved, the margins infolded, paleate, male; upper floral glume as long as the lower, oblong, obtuse, 2-sexual; palea narrow. Lodicules 2, cuneate. Stamens 3; anthers linear. Styles and stigmas small, not exserted. Grain oblong, free.—DISTRIB. Tropical Asia and Africa; species 1 or 2.

1. **Ophiurus corymbosus,** *Gærtn. f. Fruct.* v. 3 (1805) p. 4, t. 181, fig. 3 *a* (*Ophiuros*). Perennial; stems erect from a tuberous base, 3–6 ft. high, reed-like, as thick as a goose-quill below, solid, branching upwards, leafy throughout; nodes glabrous. Leaves 6–24 by $\frac{3}{8}$–1 in., flat (convolute in vernation), linear-lanceolate from a rounded base, finely acuminate, hairy above with bulbous-based hairs, glabrous beneath, the margins spinulose; sheaths short, terete, the upper leafless; ligule very short. Spikes 2–5 by $1\frac{1}{2}$ in., corymbosely fasciculate, erect, often in very dense fascicles, frequently tinged with purple; peduncles short; joints as long and as broad as the spikelets, the tip obliquely truncate. Spikelets $\frac{1}{8}$ in. long. Glumes 4; lower invol.-glume thickly coriaceous or cartilaginous, oblong, obtuse, convex, more or less seriately foveolate on the back, glabrous, at length recurved; upper invol.-glume membranous, as long as the lower, faintly 3-nerved; lower floral glume equalling the lower invol.-glume, elliptic, obtuse, hyaline, paleate, male; upper floral glume as long as the lower, elliptic-oblong, obtuse. Anthers $\frac{1}{2}$ in. long. Fl. B. I. v. 7, p. 160; Dalz. & Gibs. p. 300; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1191. *Rottboellia corymbosa*, Linn. f. Suppl. (1781) p. 114; Grah. Cat. p. 233.—Flowers: Dec. VERN. *Hutia.*

DECCAN: pastures, *Dalzell & Gibson*; Poona, *Cooke!*, *Woodrow*; Jeur (Ahmednagar districts), *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 807! GUJARAT: *Dalzell & Gibson*, *Woodrow*.—DISTRIB. India (Himalaya and Khasia Hills, N. Bengal, W. Peninsula); Tonkin, Australia.

21. **ROTTBOELLIA,** Linn. f.

Annual or perennial grasses of various habit; stems leafy. Leaves narrow, flat. Racemes solitary or subpaniculate; rhachis articulate; internodes terete or compressed, each bearing a pair of usually dissimilar awnless spikelets, the lower 1–2-flowered, usually 2-sexual, the upper pedicellate, male or neuter, sometimes rudimentary, the pedicel free or adnate to the side of the internode. Glumes 4; lower invol.-glume

coriaceous, dorsally flattened or subconvex, ovate or oblong, usually obtuse; upper invol.-glume chartaceous to membranous, muticous; lower floral glume hyaline, paleate or not; upper floral glume paleate, 2-sexual. Lodicules 2, quadrate or cuneate. Stamens 3. Stigmas generally laterally exserted. Grain broadly oblong.—DISTRIB. Species about 30, temperate and tropical.

Rhachis of raceme not fragile; lower invol.-glume not winged; a perennial grass ..... 1. *R. compressa.*
Rhachis of raceme fragile; lower invol.-glume winged (scarcely winged in *R. exaltata*).
Annual; stems less than 30 in. long; lower invol.-glume broadly winged.
Lower invol.-glume 2-aristate ..... 2. *R. divergens.*
Lower invol.-glume with a simple awn or acuminate.
Pedicel of upper spikelet adnate to the joint of the rhachis.
Lower invol.-glume broadly ovate, acuminate (not awned)..... 3. *R. acuminata.*
Lower invol.-glume lanceolate with a slender scabrid awn ..... 4. *R. Talboti.*
Pedicel of upper spikelet wholly free from the joint of the rhachis; lower invol.-glume awnless ..... 5. *R. Clarkei.*
Perennial; stems 6–10 ft. long; lower invol.-glume scarcely winged ..... 6. *R. exaltata.*

1. **Rottboellia compressa,** *Linn. f. Suppl.* (1781) p. 114. Perennial; stems erect from a decumbent rooting base, 2–5 ft. long (according to Roxburgh scandent and reaching 20 ft. long), branched, compressed, glabrous, striate, leafy. Leaves 1–5 by $\frac{1}{8}$–$\frac{1}{5}$ in., linear, acuminate, flat, glabrous, base rounded, margins scabrid; sheaths shorter than the internodes, compressed, loose, glabrous; ligule short, membranous, ciliate. Racemes few or many, often fascicled, 2–5 in. long, erect, straight or curved, herbaceous, dark green; rhachis almost inarticulate; internodes broad, striate, glabrous, nearly as long as the glabrous spikelets. *Sessile spikelets* $\frac{1}{6}$–$\frac{1}{5}$ in. long; callus small, naked. Glumes 4; lower invol.-glume coriaceous, bluntly acuminate, the tip often shortly membranous, 7–9-nerved; upper invol.-glume as long as the lower, linear-oblong, acutely acuminate, membranous, 3-nerved, adhering to the cavity of the internode; floral glumes subequal, $\frac{1}{8}$ in. long, lanceolate, acute, nerveless, hyaline; palea linear, $\frac{1}{10}$ in. long. *Pedicellate spikelets* rather longer and narrower than the sessile; lower invol.-glume acutely acuminate; upper invol.-glume chartaceous, 5–7-nerved; floral glumes as in the sessile spikelets. Fl. B. I. v. 7, p. 153; Grah. Cat. p. 233; Roxb. Fl. Ind. v. 1, p. 354; Trim. Fl. Ceyl. v. 5, p. 206; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1192.—Flowers: Nov. VERN. *Baika.*

GUJARAT: Godra, *Cooke!* SIND: *Woodrow*; Shikarpur, *Woodrow.*—DISTRIB. Throughout the hotter parts of India, generally in wet places; Ceylon, most warm climates.

2. **Rottboellia divergens,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 292. Annual; stems 4–9 in. high, erect or ascending, slender; nodes 2–3, all with usually 2-nate flowering branches. Leaves 2–4 by $\frac{1}{10}$–$\frac{1}{8}$ in., linear, acuminate, complicate, rising

without constriction from the sheath, hairy; sheaths 1–1½ in. long, shorter than the internodes, loose, hairy; ligule $\frac{1}{12}$ in. long, membranous, rounded. Raceme 1–1½ in. long, pale yellow, simple, solitary; peduncle filiform, sheathed; joints of the rhachis shorter than the spikelets, subclavate, excised. *Sessile spikelets* ¼ in. long (excluding the awns), nearly ½ in. long when the awns are included, 2-aristate; callus short. Glumes 4; lower invol.-glume coriaceous, with 5–7 transverse echinulate ridges below the middle, the tips of the echinæ curved upwards, the central portion of the glume above the echinate base ovate-lanceolate, acute, cleft at the apex, with 2 nearly semicircular equal membranous wings with thickened flattened green margins on the inner edge, which margins are prolonged into slender slightly divergent awns; upper invol.-glume much shorter, about ⅛ in. long, thinly membranous, oblong, acute, 1-nerved; lower floral glume about $\frac{1}{10}$ in. long, broadly ovate, nerveless, empty; upper floral glume slightly shorter than the lower. *Pedicellate spikelets* as long as the sessile; pedicels about $\frac{1}{10}$ in. long; lower invol.-glume chartaceous without a muricate base, winged on one side only and with 1 awn from the thickened margin of the wing, about 7-nerved; upper invol.-glume with a large membranous wing on the back at the apex and an awn about $\frac{1}{12}$ in. long. Fl. B. I. v. 7, p. 155; Lisboa, in Journ. Bomb. Nat. v. 6 (1891) p. 195; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Sept. VERN. *Marel.*

DECCAN: Khandala, *Woodrow*; Sattara, *Lisboa*!; Mahableshwar, *Lisboa*! S. M. COUNTRY: Belgaum, *Ritchie*, 808! and 827!—DISTRIB. India (W. Peninsula).

The specimens from the Bombay Presidency in Herb. Kew. are much larger in all their parts than the specimens collected by Huegel from which Hackel described the species originally, and to which no precise locality has been assigned.

3. **Rottboellia acuminata,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 291. Annual, quite glabrous except the sheaths; stems 3–12 in. high, erect or ascending, compressed, densely leafy. Leaves flaccid, the lower 2–3 by $\frac{1}{10}$–$\frac{1}{6}$ in., linear-lanceolate, acuminate from a narrow base, the upper shorter, spreading and recurved; sheaths turgid, compressed, keeled, the mouth hairy; ligule short, truncate, membranous, glabrous. Racemes 1–2 in. long, sheathed at the base, straight or slightly curved, usually pale brown; joints subclavate, much shorter than the sessile spikelets, the base not excised. *Sessile spikelets* up to ⅓ in. long; callus scarcely distinct. Glumes 4; lower invol.-glume ⅓ in. long, ovate, coriaceous, winged above the middle, with 3–6 dorsal transverse echinulate or warted ridges below the wings, longitudinally striate between the ridges, 5-nerved in the narrow coriaceous part between the wings, with a long ciliate acumen, the cilia pointing upwards; upper invol.-glume ⅙ in. long (equalling the lower minus the acumen), elliptic-lanceolate, membranous, subacute, scarcely keeled, 3-nerved; lower floral glume equalling the upper invol.-glume, elliptic, paleate, male; upper floral glume less than ⅛ in. long, oblong, obtuse, nerveless; palea small, 2-lobed, nerveless. *Pedicellate spikelets* ⅙ in. long, oblong; lower invol.-glume lanceolate, 5-nerved, with a membranous ciliolate wing on one side; upper invol.-glume shortly winged on the back below the apex, elliptic, concave, 3-nerved; lower floral glume empty; upper floral glume male; pedicel $\frac{1}{10}$ in. long, dumbell-shaped, flattened.

Fl. B. I. v. 7, p. 155; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Oct.

KONKAN: *Stocks*!; Malwán, *Woodrow*; Marmagão, *Talbot*, 1291!. KANARA: Karwar, *Lisboa*!, *Talbot*, 2539!—DISTRIB. India (W. Peninsula).

4. **Rottboellia Talboti,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 155. Annual; stems 6–8 in. high. slender, erect, or geniculate at the base. Leaves 2–3 by $\frac{1}{10}$–$\frac{1}{8}$ in., linear, smooth; sheaths glabrous; ligule short, membranous. Raceme $\frac{3}{4}$–$1\frac{1}{4}$ by $\frac{1}{6}$ in., solitary, green; joints very short, tumid, excavate opposite the spikelet, the top broad, with a very large cavity and thick hispidulous margins. *Sessile spikelets* $\frac{1}{2}$ in. long (or more) including the awn, closely imbricating; callus annular, ciliolate Glumes 4; lower invol.-glume $\frac{1}{5}$ in. long (not including the awn), coriaceous, lanceolate, narrowed into a slender scabrid awn, with 2-3 transverse ridges at the base, the uppermost ridge extending right across the glume, the others only in its centre, broadly winged at each side above the base; upper invol.-glume $\frac{1}{8}$ in. long, thinly membranous, ovate-oblong acute, 1-nerved; lower floral glume broadly oblong, faintly 3-nerved, male; upper floral glume small, oblong, obtuse, nerveless; palea as long, nerveless. *Pedicellate spikelets* as long as the sessile; lower invol.-glume very irregularly winged, dorsally smooth, awnless, as in the sessile; pedicel wholly adnate to the joint of the rhachis. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Oct.

Goa, *Talbot*, 2572!

There is but one sheet in Herb. Kew., the specimens on which were collected at Goa by Mr. Talbot.

The species is allied to *R. divergens*, from which it differs in the lower invol.-glume of the sessile spikelets, which in that species is 2- in this 1-awned, and in the tumid joints of the rhachis.

5. **Rottboellia Clarkei,** *Hack. in Œstr. Bot. Zeitschr.* v. 41 (1891) p. 8. Annual; stem 8–24 in. high, erect, striate, compressed; nodes with a small ring of hairs. Leaves 4–6 by $\frac{1}{3}$–$\frac{1}{2}$ in., linear-lanceolate, acuminate, narrowed to the subcordate base, scabrous and more or less hairy, the hairs with minutely tubercular bases; midrib prominent; sheaths compressed, ciliate; ligule a hairy membrane. Raceme solitary, $\frac{1}{2}$–1 in. long, pale yellow, supported by a spathe; rhachis very fragile; joints pyriform, shorter than the spikelets, ciliolate and with a broad cavity at the tip, the sides not hollowed. *Sessile spikelets* $\frac{1}{10}$–$\frac{1}{8}$ in. long, obtuse, closely imbricating; callus short and broad, cylindric. Glumes 4; lower invol.-glume with an ovate coriaceous 3–5-nerved disk and hyaline wings which are ciliate at the tip, dorsally gibbous, scabrid and hairy below the middle; upper invol.-glume $\frac{1}{10}$ in. long, ovate-oblong, subacute, membranous, 1-nerved, glabrous; lower floral glume shorter than the upper invol.-glume, ovate-oblong, subobtuse, hyaline, nerveless; upper floral glume rather smaller than the lower, oblong, obtuse, hyaline, nerveless, the margins incurved; palea like the glume, nerveless. *Pedicellate spikelets* imperfect, consisting usually of a solitary empty glume about $\frac{1}{20}$ in. long; pedicel quite free from the rhachis, pyriform, flattened, about $\frac{1}{16}$ in. long, Fl. B. I. v. 7, p. 156; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain,

Beng. Pl. p. 1192. *Rottboellia gibbosa*, Hack. ex Lisboa, in Journ. Bomb. Nat. v. 6 (1891) p. 195.—Flowers: Nov.

KANARA: Birchi (N. Kanara), *Talbot*, 2072!, *Lisboa*.—DISTRIB. India (Behar, Chota Nagpur, W. Peninsula).

6. **Rottboellia exaltata,** *Linn. f. Suppl.* (1781) p. 114. Perennial; stem 6–10 ft. high, erect, leafy, solid, smooth, branching from the base. Leaves 6–24 by ¼–1 in., linear-lanceolate, setaceously acuminate, scabrid or hispid and green above, smooth and glaucous beneath, the margins spinulosely scabrid; midrib stout, prominent beneath; sheaths loose, glabrous or hispid, the mouth contracted; ligule short, ciliate. Racemes 3–6 in. long, terete, glabrous, fragile, the upper part of the raceme slender, with imperfect spikelets; internodes $\frac{1}{6}$–$\frac{1}{5}$ in. long, dorsally rounded, smooth. *Sessile spikelets* about as long as the internodes, ⅛ in. long. Glumes 4; lower invol.-glume ⅕ in. long, ovate-oblong, obtuse, coriaceous, smooth, with truncate base, many obscure nerves and scaberulous margins; upper invol.-glume equalling the lower, chartaceous, broadly ovate, acute, 9–11-nerved, the keel very shortly winged towards the tip; lower floral glume as long as the lower invol.-glume, broadly ovate, acute, 3-nerved, rigidly membranous, paleate, male, the palea like the glume, with incurved margins; upper floral glume a little shorter than the lower, ovate from a broad base, acute, 1-nerved; palea as long as the glume, hyaline, nerveless. *Pedicellate spikelets* more or less imperfect; lower invol.-glume narrowly winged. Fl. B. I. v. 7, p. 156; Grah. Cat. p. 233; Trim. Fl. Ceyl. v. 5, p. 207; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1192.—Flowers: Nov. VERN. *Bursali.*

KONKAN: *Stocks*! DECCAN: Poona, *Cooke*!, *Woodrow*, 2!—DISTRIB Plains and lower hills of India; Ceylon, China, Malaya, Australia, Africa.

22. MANISURIS, Sw.

Annual erect slender leafy grasses. Leaves flat, cordate. Racemes small, terete, axillary and terminal, shortly pedunculate; rhachis green, ultimately fragile, glabrous, with short broad internodes excavate opposite the sessile spikelets. Spikelets minute, in dissimilar pairs, one globose, sessile, 2-sexual, the other ovate, pedicellate, male or neuter, the pedicel adnate or closely appressed to the joint of the rhachis. *Sessile spikelets*: glumes 4; lower invol.-glume hard, globose, foveolate, coriaceous at length crustaceous, with an oblong opening opposite the rhachis; upper invol.-glume minute, oblong, coriaceous, 1-nerved, closing the orifice of the lower invol.-glume; lower floral glume very minute, hyaline, orbicular, empty; upper floral glume and its palea hyaline, broadly oblong. Lodicules 2, subquadrate. Anthers minute. Styles and stigmas short.—DISTRIB. Species 2, tropical.

1. **Manisuris granularis,** *Linn. f. Nov. Gram. Gen.* (1779) p. 40. Stems 4–30 in. high, slender, compressed, softly hairy, leafy; nodes hairy. Leaves 1½–8 by ¼–½ in., linear-lanceolate, acute or acuminate, flat, hairy on both surfaces or on the lower only with bulbous-based hairs, margins ciliate, base cordate; sheaths much shorter than the internodes, hispid with bulbous-based hairs; ligule very short,

membranous, densely ciliate. Racemes $\frac{1}{4}$–1 in. long, resembling a string of minute beads, solitary or seemingly fascicled in the axils of the leaves, but individually from shortened axillary branches. *Sessile spikelets* $\frac{1}{16}$–$\frac{1}{12}$ in. long, subglobose; callus tumid, glabrous. Glumes 4; lower invol.-glume irregularly foveolate on the back; upper invol.-glume closing the cavity of the lower floral glume, elliptic-oblong, obtuse, 1-nerved; lower floral glume hyaline, shorter than the upper invol.-glume; upper floral glume about equalling the lower, broadly ovate, obtuse; palea similar but a little shorter. *Pedicellate spikelets* equal in length to the sessile or longer, of 2 equal green glumes about $\frac{1}{10}$ in. long; lower invol.-glume broadly ovate or suborbicular, obtuse or subacute, 5–7-nerved, one margin narrowly folded, the other with a hyaline wing; upper invol.-glume boat-shaped, laterally compressed, the keel with a dorsal hyaline ciliolate wing. Fl. B. I. v. 7, p. 159; Grah. Cat. p. 234; Dalz. & Gibs. p. 300; Trim. Fl. Ceyl. v. 5, p. 209; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1191; Watt, Dict. Econ. Prod. v. 5, p. 164.—Flowers: Oct.

Common throughout the Presidency on barren land. DECCAN: Poona, *Cooke*!; Khandala, *Woodrow*. S. M. COUNTRY: Dharwar, *Woodrow*.—DISTRIB. Throughout the hotter parts of India; Ceylon, most tropical countries.

23. **APLUDA,** Linn.

A tall slender perennial leafy grass; stems erect or subscandent, branching. Leaves narrow, flat, more or less petiolate. Inflorescence paniculate, leafy, of small spikes each in a spathiform bract. Spikes deformed, base rounded, often utricular, bearing in front a sessile 2-sexual spikelet, prolonged above the base into 2 flat linear truncate parallel arms, one terminated by a solitary minute glume, the other by the upper spikelet. Glumes of both spikelets 4, the invol.-glumes empty, the floral glumes delicately membranous. *Lower spikelets*: lower invol.-glume longest, anticous, linear-oblong, coriaceous, rigid; upper invol.-glume thinner, tumid, beaked, dorsally gibbous, 7-nerved; lower floral glume oblong, acute, 3-nerved, triandrous or neuter, with a linear 2-nerved palea; upper floral glume short, quadrate, deeply 2-fid, awned in the sinus, female or 2-sexual, with a minute ovate palea. Styles short, free; stigmas short, penicillate. *Upper spikelets* dorsally compressed; lower invol.-glume oblong, acute, many-nerved, herbaceous, the margins narrowly incurved; upper invol.-glume chartaceous, ovate-lanceolate, acuminate, 3-nerved; lower floral glume oblong, 1-nerved, triandrous; upper floral glume oblong, 1-nerved, female or imperfectly 2-sexual; paleas of both floral glumes as in the lower spikelets. Lodicules of all flowers 2, cuneate. Anthers linear. Grain oblong, subcompressed.—DISTRIB. India, China, Pacific Islands; species 1.

1. **Apluda varia,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 196. Stems densely tufted, geniculately ascending, 1–6 ft. high, erect or the branches rambling among bushes, stout or slender, sometimes as thick as a goose-quill below, smooth and polished; internodes very long, solid. Leaves 4–18 by $\frac{1}{10}$–$\frac{3}{4}$ in., narrowed from the middle to a filiform tip and usually below it into a long or short

slender petiole, flat, scaberulous on both surfaces with scabrid margins; sheaths long, smooth, the mouth not auricled; ligule chartaceous, oblong, lacerate. Inflorescence very variable, of spikelets clustered on short peduncles, the clusters solitary or few or very numerous and arranged in elongate bracteate very contracted interrupted leafy panicles; rhachis of inflorescence slender, glabrous or slightly scabrid; bracts of spikelets $\frac{1}{8}$–$\frac{1}{3}$ in. long, sessile or pedicellate, cymbiform, green, striate, with aristulate tip. Spikes longer or shorter than the bracts, with rounded base. *Sessile spikelets* $\frac{1}{8}$–$\frac{1}{5}$ in. long; lower invol.-glume spreading, strict or recurved, bicuspidate, with hyaline margins; upper floral glume 3–5-nerved below the sinus, the lateral nerves arching and meeting the midnerve at the insertion of the awn. Fl. B. I. v. 7, p. 150; Trim. Fl. Ceyl. v. 5, p. 226; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1194.—Flowers: Oct.–Dec. VERN. *Ghayara.*

KONKAN: *Law!*, *Woodrow.* DECCAN: *Woodrow*, 115! S. M. COUNTRY: Belgaum, *Ritchie*, 824! GUJARAT: Surat, *Cooke!*; Ahmedabad, *Cooke!*—DISTRIB. Throughout India; Ceylon, E. Trop. Asia, Malaya, Australia, Pacific Islands.

Hackel divides the forms of this variable plant into 2 subspecies—one *mutica*, which is rarely awned; the other *aristata*, the spikelets of which are always awned. Of *aristata* Hackel has 4 varieties, to the first of which, *aristata proper*, most of the Bombay specimens are referable.

24. ISCHÆMUM, Linn.

Annual or perennial grasses. Leaves narrow. Racemes solitary, digitate or fascicled, articulate, fragile; internodes of rhachis and the pedicels of the upper spikelets trigonous, hollowed ventrally. Spikelets 2-nate, one sessile and one pedicellate, the pedicellate spikelet often dissimilar from the sessile. *Sessile spikelets*: glumes 4; invol.-glumes subequal, coriaceous or chartaceous, awnless or the upper sometimes awned; lower invol.-glume ovate-oblong or oblong-lanceolate, convex, more or less marginally winged above the middle; upper invol.-glume lanceolate, acuminate, concave; lower floral glume hyaline, paleate, triandrous, with a narrow lanceolate acuminate 2-nerved palea; upper floral glume hyaline, usually deeply 2-cleft, awned, the awn geniculate with a brown twisted column. Lodicules cuneate or quadrate. Stamens 3; anthers linear. Styles long; stigmas short. *Pedicellate spikelets* with pedicel half as long as the sessile spikelet or shorter; upper floral glume rarely awned.—DISTRIB. Species about 40, chiefly tropical.

Racemes 2–3 (rarely more); lower invol.-glume dorsally flat, not channelled or depressed along the median line.
- Margins of lower invol.-glume of sessile spikelets narrowly inflexed or incurved from base to apex.
  - Leaves rounded at the base (slightly cordate in *I. molle*), sessile on the sheath.
    - Pedicel of upper spikelet less than ½ the length of the lower spikelet.
      - Lower invol.-glume of sessile spikelets with nodulose margins ..... 1. *I. aristatum.*
      - Lower invol.-glume of sessile spikelets closely transversely ribbed ..... 2. *I. rugosum.*
      - Lower invol.-glume of sessile spikelets dorsally villous all over, not transversely ridged nor with nodulose margins ..... 3. *I. molle.*

Pedicel of upper spikelet $\frac{1}{3}$ the length of the lower spikelet or more.
Stems woolly at the base ..... 4. *I. angustifolium.*
Stems not woolly at the base.
Upper invol.-glume of sessile spikelets 2-fid, 3-nerved; lateral nerves pectinately ciliate at the apex ..... 5. *I. diplopogon.*
Upper invol.-glume of sessile spikelets acuminate, 5-nerved; lateral nerves anastomosing, not pectinately ciliate. 6. *I. pilosum.*
Leaves hastate or deeply cordate at the base, petiolate .... 7. *I. semisagittatum.*
Margins of lower invol.-glume of sessile spikelets broadly incurved below the middle.
Sessile spikelets $\frac{1}{8}$ in. long; callus large, glabrous; awn $\frac{1}{6}$ in. long ..... 8. *I. Lisboæ.*
Sessile spikelets $\frac{1}{5}$ in. long; callus short, bearded; awn $\frac{1}{2}$ in. long ..... 9. *I. ciliare.*
Raceme solitary: lower invol.-glume of sessile spikelets deeply channelled or depressed along the median line.
Racemes enclosed in long narrow spathes ..... 10. *I. spathiflorum.*
Racemes not enclosed in spathes.
Lower invol.-glume of sessile spikelets 6-nerved; upper invol.-glume of pedicellate spikelets shortly awned. 11. *I. laxum.*
Lower invol.-glume of sessile spikelets 2-nerved; upper invol.-glume of pedicellate spikelets not awned..... 12. *I. sulcatum.*

1. **Ischæmum aristatum,** *Linn. Sp. Pl.* (1753) p. 1049. Perennial; stems 1–4 ft. high, stout, erect or decumbent at the base, simple or branched above, leafy, glabrous, thickened at the top below the spikes. Leaves 4–10 by $\frac{1}{4}$–1 in., linear-lanceolate, finely acuminate, glabrous or sparsely hairy, glaucous beneath, narrowed to the acute or subcordate base, with scabrid margins; sheaths loose, glabrous, the mouth naked, auricled; ligule membranous. Racemes 1 or 2, stout or slender, 1–4 in. long. Spikelets reaching $\frac{1}{5}$ in. long, a sessile and a pedicellate closely pressed together; callus of sessile spikelets broad, thick, $\frac{1}{25}$ in. long. *Sessile spikelets*: lower invol.-glume $\frac{1}{5}$ in. long, broadly oblong, cartilaginous and often purplish below the middle, with 2–4 marginal nodules on each edge transversely connected by shallow ridges, thinner above the middle, with green anastomosing veins, tip obtuse or 2-dentate, margins narrowly incurved, ciliolate; upper invol.-glume lanceolate, acuminate, 1-nerved, with smooth rounded keel; lower floral glume ovate-lanceolate, acuminate, 1-nerved, membranous, male or 2-sexual, with an oblong palea; upper floral glume female, cleft to or below the middle into lanceolate acuminate lobes, with a brownish-red awn $\frac{1}{2}$ in. or more long at the sinus, twisted below, straight above; palea linear-oblong. *Pedicellate spikelets* as long as the sessile, inarticulate on the very thick amorphous pedicel, which is densely silky-hairy at the base; lower invol.-glume gibbous or scimitar-shaped, acute, coriaceous, tinged with purple, with a ciliolate semicircular wing; upper invol.-glume and lower floral glume as in the sessile spikelets; upper floral glume hyaline, with a mucro or very short awn. Fl. B. I. v. 7, p. 126; Grah. Cat. p. 239; Dalz. & Gibs. p. 306; Trim. Fl. Ceyl. v. 5, p. 211; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1195.—Flowers: Oct.–Dec. VERN. *Bherda*; *Guj.*

KONKAN: Matunga near Bombay, *Woodrow*, 4! S. M. COUNTRY: Belgaum, *Ritchie*, 812, 2!—DISTRIB. Plains and lower hills of India; Ceylon, China, Malaya.

2. **Ischæmum rugosum,** *Salisb. Ic. Stirp. Rar.* (1791) p. 1, t. 1. Annual; stems 1–2 ft. long, erect or ascending, slightly thickened beneath the inflorescence, leafy, compressed; nodes glabrous or bearded. Leaves 4–6 by $\frac{1}{6}$–$\frac{1}{2}$ in., linear-lanceolate, acuminate, flat, glabrous or sparsely hairy, the margins scabrid, the uppermost leaves often reduced to spathiform lanceolate sheaths which partially enclose the racemes; sheaths compressed, loose, glabrous, the mouth auricled, the auricles membranous, confluent with the truncate ligules. Racemes usually 2, erect, pale yellow, glabrous, 1–3 in. long, fragile; rhachis trigonous, ciliate on the dorsal angle. Spikelets reaching $\frac{1}{4}$ in. long or more, linear-oblong, the sessile and pedicellate closely pressed together; pedicel of the latter very short and thick, clavate, angular, confluent with the bristly thick callus of the sessile spikelet. *Sessile spikelets*: lower invol.-glume cartilaginous for $\frac{2}{3}$ of its length from the base, the cartilaginous portion pale yellow, shining, concave, crossed by 3–6 deep smooth ridges, the upper third flattened, thinner, membranous, obtuse, with green veins, the margins narrowly incurved, the outer margin winged; upper invol.-glume oblong-lanceolate, acuminate, keeled, the keel with a narrow ciliolate wing below the tip; lower floral glume ovate-lanceolate, acuminate, hyaline, male or empty, paleate, the palea hyaline, narrow; upper floral glume $\frac{1}{6}$ in. long, deeply cleft into 2 acute lanceolate lobes; palea linear-lanceolate; awn reaching $\frac{5}{8}$ in. long or more. *Pedicellate spikelets* variable, rather shorter than the sessile; lower invol.-glume like that of the sessile or with fewer or sometimes more or less obscure transverse ridges, the upper half of the glume broader and more oblique; upper invol.-glume not keeled, otherwise as in the sessile spikelet; lower floral glume as in the sessile; upper floral glume oblong, obtuse, not awned. Fl. B. I. v. 7, p. 127; Grah. Cat. p. 239; Dalz. & Gibs. p. 305; Trim. Fl. Ceyl. v. 5, p. 212; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1195; Watt, Dict. Econ. Prod. v. 4, p. 531.—Flowers: Oct.

Deccan: Poona, *Woodrow.*—Distrib. Throughout India; Ceylon, China, Malaya.

3. **Ischæmum molle,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 128. Stem 3–4 ft. long, solid, smooth, stout, leafy. Leaves 6–10 by $\frac{1}{4}$–$\frac{1}{3}$ in., linear, finely acuminate, sparsely hairy, base rounded, cordate; sheaths 4–6 in. long, smooth, glabrous or sparsely hairy above, the mouth villous. Racemes 1–2, axillary and terminal, 3–5 in. long, densely villous with soft white hairs. Spikelets reaching $\frac{1}{5}$ in. long; callus of sessile spikelets very short and broad. *Sessile spikelets*: lower invol.-glume thinly coriaceous, broadly ovate, obtuse, dorsally villous all over, many-nerved; upper invol.-glume chartaceous, obtuse, silky, keeled, the keel with a narrow ciliolate wing from the middle upwards; lower floral glume ovate, obtuse, hyaline, 3-nerved, ciliolate, paleate, the palea as long as the glume, narrow, obtuse; upper floral glume shorter than the lower one, cleft to the middle into 2 lanceolate acuminate ciliolate lobes; palea small, narrow; awn nearly $\frac{3}{4}$ in. long, the lower half dark brown, the upper half yellowish-white. *Pedicellate spikelets* rather smaller than the sessile, with similar glumes but awnless. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436.—Flowers: Oct.–Dec.

Deccan: Lanoli, *Woodrow.*

There is but one sheet from the Bombay Presidency in Herb. Kew. from Dalzell's Herbarium, but no locality is given for the plant. There is one other small specimen of the plant in the Kew Herbarium, collected in the Chanda district, Central Provinces, by Mr. Duthie.

4. **Ischæmum angustifolium,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 241. Perennial; stems tufted, woolly at the base, 2–3 ft. high, erect, slender, sparingly branched, grooved on one side, glabrous. Leaves 1–2 ft. by $\frac{1}{10}$–$\frac{1}{6}$ in., tapering into a subpungent acumen, concave or convolute, base obtuse, fimbriate, margins scaberulous; sheaths glabrous; ligule a tuft of short hairs. Racemes 2–4, on axillary and terminal filiform peduncles, 1–2 in. long, close or distant, erect, golden or rusty-villous; joints and pedicels $\frac{1}{2}$ as long as the lower spikelet, slender, shortly ciliate, the pedicels bearded at the base. *Sessile spikelets* $\frac{1}{6}$ in. long, lanceolate; callus short, hairy. Glumes 4; lower invol.-glume $\frac{1}{8}$ in. long, elliptic-oblong, chartaceous, 2–3-toothed, 5-nerved, the lower part of the glume ciliate with long rufous hairs and also with a tuft of hairs at the middle of the lower part of the back; upper invol.-glume $\frac{1}{6}$ in. long, membranous, ovate-lanceolate, 2-dentate, often mucronate between the teeth, 3–5-nerved; lower floral glume equalling the lower invol.-glume, oblong, obtuse, irregularly 2-dentate, hyaline, nerveless, paleate, the palea a little shorter than the glume, linear, 2-dentate; upper floral glume $\frac{1}{8}$ in. long, linear, hyaline, usually 2-dentate, but sometimes only acute at the apex; palea shorter than the glume; awn reaching $\frac{3}{8}$ in. long. *Pedicellate spikelets* like the sessile. Fl. B. I. v. 7, p. 129; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1195; Watt, Dict. Econ. Prod. v. 4, p. 526.—Flowers: Dec.–Feb. VERN. *Sabai.*

DECCAN: cultivated at Poona, *Woodrow.* GUJARAT: Rajkot (Kathiawar), *Woodrow.* —DISTRIB. India (Lower Himalaya, Panjáb, Rajputana, Behar, Central India); Afghanistan, China, Philippines.

The grass was cultivated at Poona for paper-making by the Deccan Paper Mills. It was found suitable for the lower grades of paper, but for the higher grades was not satisfactory. The nodes are hard, and if boiled long enough to soften them the remaining parts are overboiled and useless.

5. **Ischæmum diplopogon,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 129. Annual; stem 12–20 in. long, branched from the base and upwards; nodes glabrous; internodes long. Leaves 3–6 by $\frac{1}{4}$–$\frac{5}{8}$ in., linear-lanceolate from a narrow base, acuminate, with many slender nerves, dark green and shining above; sheaths glabrous, those of the upper leaves open, spathiform; ligule an oblong glabrous membrane. Peduncles many from the upper spathe-like sheaths, solitary, filiform, the spathes 1–3 in. long, lanceolate. Racemes usually 2, compressed, 1–$1\frac{3}{4}$ in. long; joints and pedicels $\frac{1}{2}$ the length of the lower spikelets or longer, subclavate, dorsally rounded, ventrally concave. *Sessile spikelets*: callus nearly $\frac{1}{10}$ in. long, thick. Spikelets reaching $\frac{1}{4}$ in. long. Glumes 4; lower invol.-glume $\frac{1}{5}$ in. long, oblong, shortly 2-cuspidate, obscurely nerved and with shortly incurved margins; upper invol.-glume $\frac{1}{5}$ in. long, ovate, subacute, shortly 2-fid, 3-nerved, the lateral nerves pectinately ciliate near the apex with long erect hairs and furnished with a slender whitish awn $\frac{1}{5}$ in. long; lower floral glume linear-oblong, hyaline, 1-nerved; upper floral glume $\frac{1}{6}$ in. long, 2-fid at the apex into acute lobes, hyaline;

palea small, oblong; awn reaching $\frac{5}{8}$ in. long, the lower half brown, the upper yellowish white. *Pedicellate spikelets* often imperfect, not awned. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436.

KONKAN: Matheran, *Woodrow*. DECCAN: *Woodrow*, 187!; Mahableshwar, *Woodrow*, 4!; Bhorkas near Poona, *Woodrow*, 3!—DISTRIB. India (W. Peninsula).

6. **Ischæmum pilosum,** *Hack. Monog. Andropog. in DC. Mon Phan.* v. 6 (1889) p. 240. Rhizome giving out densely scaly long stolons stems erect, 2-3 ft. long, slender, terete, glabrous; nodes glabrous. Leaves 6–12 by $\frac{1}{5}$–$\frac{1}{3}$ in., linear, finely acuminate, glabrous; sheaths glabrous; ligule rounded, $\frac{1}{12}$–$\frac{1}{8}$ in. long, membranous, glabrous. Racemes 2–6, fascicled, 1–4 in. long, yellow or brownish, pilose; rhachis hairy; joints and pedicels slender, compressed, subclavate, shorter than the sessile spikelets, sparsely ciliate; pedicel about $\frac{1}{2}$ as long as its spikelet. *Sessile spikelets* narrowly lanceolate, reaching $\frac{1}{4}$ in. long; callus minute, bearded with long hairs. Glumes 4; lower invol.-glume chartaceous, narrowed from the middle upwards, dorsally hairy, the margins incurved throughout their whole length, the nerves anastomosing; upper invol.-glume rather longer than the lower, chartaceous, ovate-lanceolate, acuminate, laterally compressed, 5-nerved, the lateral nerves anastomosing; lower floral glume a little shorter than the upper invol.-glume, linear-oblong, obtuse, ciliate above, paleate, male, the palea acute, membranous, nerveless, glabrous; upper floral glume equalling the lower one, cleft almost to the middle into acute ciliolate lobes; palea a little shorter, lanceolate-subulate, nerveless; awn $\frac{1}{4}$–$\frac{3}{8}$ in. long. *Pedicellate spikelets* $\frac{1}{6}$–$\frac{1}{5}$ in. long, like the sessile but usually with a shorter awn, sometimes imperfect or reduced to a single glume. Fl. B. I. v. 7, p. 130; Grah. Cat. p. 239; Dalz. & Gibs. p. 305; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Watt, Dict. Econ. Prod. v. 4, p. 531.—Flowers: Oct.-Mar. VERN. *Kunda*; *Nuth.*

Very common in black soil. *Dalzell* without locality in Herb. Kew.! DECCAN: *Graham, Dalzell & Gibson, Lisboa*; Khandesh, *Lisboa*; Sholapur, *Lisboa*; Sattara, *Lisboa*.—DISTRIB. India (Rajputana, Central Provinces, W. Peninsula).

7. **Ischæmum semisagittatum,** *Roxb. Hort. Beng.* (1814) p. 8. Annual; stems 1–2 ft. long, decumbent at the base, then ascending, slender, terete; nodes glabrous; internodes long. Leaves 2–3 by $\frac{3}{8}$–$\frac{5}{8}$ in., oblong-lanceolate, acuminate, with capillary tips, base auricled, broadly cordate or sagittate, the lower leaves with a filiform petiole reaching nearly 1 in. long, the upper sessile, glabrous or sparsely hairy, the margins scabrid; sheaths loose, glabrous, those of the uppermost leaves spathiform; ligule oblong, $\frac{1}{8}$ in. long, obtuse, pilose. Racemes 2, more or less softly villous with long white or grey hairs, 1–2$\frac{1}{2}$ in. long, fragile; internodes and pedicels much shorter than the spikelets, trigonous. *Sessile spikelets* $\frac{1}{6}$–$\frac{1}{4}$ in. long; callus short, bearded with long hairs. Glumes 4; lower invol.-glume ovate, convex, the lower half cartilaginous, with 3–5 obscure or more or less conspicuous ridges ending in marginal nodules, the upper half chartaceous or membranous, with green veins and ciliolate margins; upper invol.-glume equalling the lower, ovate-oblong, obtuse, coriaceous; lower floral glume a little shorter than the lower invol.-glume, ovate, acuminate, 1–3-nerved, paleate, male, the palea linear-oblong, hyaline, 2-nerved; upper floral glume female, cleft to

below the middle into acute glabrous lobes; palea linear-oblong; awn ½–⅔ in. long. *Pedicellate spikelets* rather shorter and narrower than the sessile, closely appressed to the sessile, with very broad pedicels $\frac{1}{25}$ in. long; lower invol.-glume narrowly oblong, not ridged; upper invol.- and lower floral glumes as in the sessile spikelets; upper floral glume narrowly oblong, tip 2-toothed with a minute awn. Fl. B. I. v. 7, p. 130; Trim. Fl. Ceyl. v. 5, p. 213; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1195.—Flowers: Sept.–Nov.

Konkan: *Law*!; Parel (Bombay), *Woodrow*; Thána, *Lisboa*. Deccan: *Woodrow*!; Lanoli, *Woodrow*!; Sattara, *Lisboa*. Kanara: Yellapur, *Talbot*, 738!—Distrib. India (Bengal, W. Peninsula); Ceylon.

Var. *dasyantha*, Hack. Monog. Andropog. in DC. Monog. Phan. v. 6 (1889) p. 209. Lower invol.-glume appressedly villous at least in the upper spikelets; joints scabrous with hairy margins and keel. *Ischæmum conjugatum*, Roxb. Hort. Beng. (1814) p. 8; Hook. f. Fl. B. I. v. 7, p. 131; Grah. Cat. p. 239; Dalz. & Gibs. p. 305; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1195.—Flowers: Dec.

Konkan: *Stocks*!, *Woodrow*. Kanara: Divimana, *Woodrow*.

8. **Ischæmum Lisboæ,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 133. Stem creeping below, very stout, rooting at the thickened nodes; branches ascending, 8–14 in. long, glabrous. Leaves on the creeping stem 1–2 by ¼–⅜ in., oblong, acute, closely imbricating in 2 series, the blades reflexed at right angles to the erect short open sheaths, softly tomentose on both surfaces; lower sheaths ½–1 in. long, villous; ligule short, bearded with very long hairs. Racemes 2, softly tomentose, 2 in. long; joints and pedicels about ½ as long as the spikelets, stout, shortly villous, concavo-convex, truncate. *Sessile spikelets* ⅛ in. long; callus large, glabrous. Glumes 4; lower invol.-glume thickly coriaceous, dorsally convex, 2-fid, ciliate above the middle, margins broadly incurved below the middle, keels with broad auricular ciliate wings; upper invol.-glume ⅛ in. long, rather longer than the lower, rigid, the keel winged above the middle, the back of the glume rounded below the wing, shortly awned; lower floral glume ovate-oblong, obtuse, with ciliate margins, paleate, male, the palea chartaceous, obovate, with broad hyaline wings above the middle; upper floral glume about $\frac{1}{12}$ in. long, 3-nerved below the middle, obtusely 2-lobed; palea lanceolate; awn about ⅛ in. long. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436.

Kanara: North Kanara, *Lisboa*. There is but one sheet in Herb. Kew., the specimens on which were collected in Kanara by Dr. Lisboa. I have seen no others.

9. **Ischæmum ciliare,** *Retz. Obs.* fasc. 6 (1791) p. 36. Stems tufted, up to 2 ft. long, erect or ascending, sometimes decumbent below and rooting at the nodes, slender; nodes glabrous or bearded. Leaves 2–6 by ⅛–½ in., linear or linear-lanceolate, acuminate, flat, sessile, glabrous, pubescent or villous, narrowed towards the acute or rounded base, margins scabrid; sheaths glabrous or hirsute, compressed, loose, with ciliate rounded auricles; ligule short, obtuse, membranous, ciliate. Racemes 2, rather short, 1½–2 in. long; rhachis fragile; internodes and pedicels of upper spikelets subequal, erect, compressed, trigonous, bearded dorsally and on the angles. *Sessile spikelets* ⅛–⅕ in. long, oblong

or ovoid; callus very short, oblong, bearded. Glumes 4; lower invol.-glume 2-cuspidate, coriaceous, convex, smooth or pitted, hirsute below, flatter and veined above the middle, with lateral ciliolate broad or narrow equal wings, the margins narrowly incurved above, broadly so below; upper invol.-glume as long as or longer than the lower, chartaceous, lanceolate, acuminate or shortly awned, 3–5-nerved, keel narrowly winged towards the tip; lower floral glume ovate-lanceolate, acuminate, ciliate near the tip, triandrous, paleate, the palea lanceolate, acuminate, opaque, with broad hyaline ciliolate wings; upper floral glume cleft to the middle into oblong obtuse glabrous or ciliate lobes, female; palea lanceolate, acuminate, 2-nerved, not ciliolate; awn $\frac{3}{8}$–$\frac{1}{2}$ in. long. Anthers $\frac{1}{8}$ in. long. Styles and stigmas short. *Pedicellate spikelets* like the sessile, the upper floral glume usually awned. Fl. B. I. v. 7, p. 133; Trim. Fl. Ceyl. v. 5, p. 216; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1195; Watt, Dict. Econ. Prod. v. 4, p. 530. —Flowers: Oct. VERN. *Putena.*

KONKAN: Salsette, *Jacquemont*, 710!; Parel (Bombay), *Woodrow*. KANARA: *Dalzell*!; Kakti (N. Kanara), *Young* ex *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, China, Malaya, Australia.

10. **Ischæmum spathiflorum,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 138. A tall grass reaching 3–4 ft. high, much branched above; branches erect. Stem as thick as a goose-quill below, leafy above; nodes glabrous. Leaves 1–1½ ft. by $\frac{3}{4}$ in., linear-lanceolate, finely acuminate, narrowed from the middle, often tinged with purple, almost petiolate, thin, sparsely hairy, margins smooth; midrib stout, nerves obscure; sheaths of lower leaves 6 in. long and upwards, terete, quite glabrous, the sheaths of the upper leaves passing into compressed lanceolate flowering spathes 3–4 in. long; ligule short, scarious. Racemes about 2 in. long, more or less exserted from the spathes, very slender, pale straw-colored; joints and pedicels more than ½ as long as the sessile spikelets, compressed, one angle ciliate. *Sessile spikelets* $\frac{3}{8}$ in. long, narrowly linear-lanceolate; callus very short, hairy; lower invol.-glume $\frac{3}{8}$ in. long, thinly coriaceous, nerveless, white with dense silky hairs to above the middle, dorsal furrow very deep, causing a thick ridge on the inside of the glume, margins equally incurved, the tip 2-dentate; upper invol.-glume chartaceous, dorsally convex, nerveless, but with a nerve-like fold towards the ciliate margin, keel with long cilia above the middle, scabrid towards the emarginate tip; lower floral glume shorter, hyaline, oblong-lanceolate, obtuse, 3-nerved, paleate, the palea lanceolate, the anthers imperfect; upper floral glume as long as the lower, linear, 3-nerved; palea 0; awn 1½ in. long, the column twisted, brown, the upper portion slender, usually purple. *Pedicellate spikelets* longer than the sessile; lower invol.-glume ½ in. long, dorsally convex, not furrowed lanceolate, narrowed into a bisetose often purplish awn, sparsely silky, 7–9-nerved; upper invol.-glume lanceolate, acute, glabrous; lower floral glume as in the sessile spikelet; upper floral glume awnless. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Sept.

KONKAN: Island of Salsette in hilly stony places, *Jacquemont*, 797! DECCAN: Khandala, *Woodrow*!; Palasdari on the Bhore Ghát (G. I. P. Railway), *Woodrow*.—DISTRIB. India (W. Peninsula), apparently endemic.

11. **Ischæmum laxum,** *Br. Prodr.* (1810) p. 205. Perennial; stems 2–3 ft. high, tufted on a short rootstock, simple, slender, erect, glabrous, leafy; nodes glabrous. Leaves 6–12 by $\frac{1}{10}$–$\frac{1}{6}$ in., erect, linear, narrowed to long capillary tips, flat, smooth, striate, glaucous, with minutely scaberulous margins, base not contracted; sheaths shorter than the internodes, glabrous or sparsely hairy, not auricled at the mouth; ligule a tuft of silky hairs. Raceme solitary, 2–4 in. long, suberect, pale, fragile; internodes and pedicels of upper spikelets about $\frac{1}{2}$ as long as the spikelets, concavo-convex, the sides ciliate with long silky hairs. *Sessile spikelets* $\frac{3}{8}$ in. long, linear-oblong, acuminate, pale green; callus short, obtuse, shortly bearded. Glumes 4; lower invol.-glume oblong-lanceolate, acuminate, with a broad depression in the middle instead of a midnerve, the tip 2-dentate, the teeth ending in short capillary awns, margins inflexed, nerves 6, very conspicuous on the back, the 2 lateral nerves very strong, running into the apical teeth, the 4 intermediate nerves diverging from the base in pairs, afterwards more or less converging; upper invol.-glume rather shorter than the lower, membranous, ovate-oblong, acuminate, concave, terminating in a slender awn reaching $\frac{1}{2}$ in. long, the margins ciliate near the apex, nerves 3, very slender; lower floral glume lanceolate, acuminate, hyaline, nerveless, triandrous, paleate, the palea linear-oblong, obtuse; upper floral glume $\frac{1}{5}$ in. long, linear, hyaline, deeply cleft into 2 lanceolate-subulate lobes, female; palea linear-oblong, equalling the glume; awn up to $1\frac{3}{4}$ in. long, the lower 1 in. brown, the upper $\frac{3}{4}$ in. white. *Pedicellate spikelets* as long as the sessile; lower invol.-glume $\frac{3}{8}$ in. long, ovate-oblong, bicuspidate, 7-nerved, the nerves very conspicuous on the back; upper invol.-glume 1-nerved, shortly awned; lower floral glume as in the sessile spikelet; upper floral glume triandrous, not awned. Fl. B. I. v. 7, p. 136; Trim. Fl. Ceyl. v. 5, p. 219; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1196; Watt, Dict. Econ. Prod. v. 4, p. 531.—Flowers: Sept. VERN. *Sheda*; *Paunat.*

Common throughout the Presidency. DECCAN: Khandesh (used for thatching), *Lisboa*; Poona, *Woodrow*; Poona to Karli, *Jacquemont*, 530!—DISTRIB. India (Bengal, Behar, Central Provinces, W. Peninsula); Ceylon, Australia, Cape de Verd Islands.

12. **Ischæmum sulcatum,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 248. Stems geniculate, ascending, reaching 20 in. long or more, weak, terete, glabrous, not ribbed, much branched from the base; nodes glabrous. Leaves 4–8 by $\frac{1}{8}$–$\frac{1}{6}$ in., linear or lanceolate, setaceously acuminate, many-nerved, glaucous, glabrous; sheaths lax, glabrous, constricted at the mouth; ligule a narrow ciliate membrane. Raceme solitary, 2–3 in. long; joints and pedicels shorter than the sessile spikelet, slender, ciliate. *Sessile spikelets* $\frac{3}{8}$ in. long; callus about $\frac{1}{16}$ in. long, shortly hairy at the base, cuneate; lower invol.-glume $\frac{3}{8}$ in. long, subchartaceous, bicuspidate, lanceolate, scabro-punctate, the margins incurved in the upper, open in the lower part, with a furrow in the middle in the place of the midnerve and 2 nerves one at each side of and close to the furrow; upper invol.-glume rather shorter than the lower, chartaceous, 3–5-nerved, shortly 2-dentate, ciliate in the upper part and with a capillary awn $\frac{3}{8}$ in. long from the sinus; lower floral glume $\frac{1}{4}$ in. long, linear, subacute, with incurved margins, hyaline, paleate, the palea as long, oblong, slightly emarginate; upper floral

glume ¼ in. long, divided into 2 acute lobes; palea as long as the glume; awn ¾–1½ in. long, the column brown, twisted, geniculate above the column, the upper part pale, scaberulous. *Pedicellate spikelets* smaller than the sessile, awnless; lower invol.-glume lanceolate, bicuspidate, not furrowed, the margins recurved throughout, 7-nerved, the midrib slender, the lateral nerves green, approximate, close to the margin; upper invol.-glume not awned; lower floral glume as in the sessile spikelets; upper floral glume acute, not awned. Fl. B. I. v. 7, p. 137; Woodrow, in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Oct.

Deccan: Sattara, *Lisboa*; Malsiras (Sholapur taluka), *Lisboa*.—Distrib. India (Central Provinces, W. Peninsula).

25. **POGONATHERUM,** Beauv.

Delicate perennial grasses; stems leafy upwards, branching. Leaves narrow, suberect. Racemes solitary on long flexuous peduncles, plumose from the slender awns; rhachis at length fragile; internodes short. Spikelets very small, subterete, 2-nate, 1–2-flowered, a sessile 2-sexual, and a pedicellate male or neuter (rarely 2-sexual); callus bearded with fine hairs. Glumes 3 or 4, all membranous and hyaline, obscurely nerved or nerveless; lower invol.-glume oblong, truncate, dorsally rounded; upper invol.-glume longer, ovate, keeled, 2-fid and awned in the sinus, the awn much longer than the spikelet, slightly twisted; lower floral glume nearly as long as the upper invol.-glume, not awned, usually absent from the pedicellate spikelet; upper floral glume about ½ as long as the upper invol.-glume, 2-fid and awned in the sinus like the upper invol.-glume; palea broadly oblong, not keeled. Lodicules obsolete. Stamens 1 or 2; anthers long. Ovary narrow; styles short, free; stigmas very long, exserted at the top of the spikelet. Grain narrow, oblong, free.—Distrib. India, Afghanistan, China, Malaya, New Hebrides.

1. **Pogonatherum crinitum,** *Kunth, Enum. Pl.* v. 1 (1833) p. 478. Stems 6–12 in. long, densely tufted. Leaves 1–3 by $\frac{1}{10}$–$\frac{1}{5}$ in., linear-lanceolate, acuminate, more or less hairy; sheaths lax, glabrous with a hairy mouth; ligule of long hairs. Racemes terminating the branches of the stem, ¾–1 in. long; rhachis slender; internodes short, ciliate; tips thickened, truncate. Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long, usually monandrous; hairs of callus longer than the spikelets. Glumes nerveless, hyaline; lower invol.-glume oblong, dorsally rounded, ciliate at the rounded or retuse tip; upper invol.-glume longer than the lower, ovate, keeled, 2-fid, the lobes ciliolate, awned in the sinus with a long capillary awn ½ in. long or more; lower floral glume linear, nearly as long as the upper invol.-glume, not awned, sometimes absent; upper floral glume cleft to the middle into 2 ciliolate lobes; awn straight or recurved, ¾ in. long. Fl. B. I. v. 7, p. 141; Trim. Fl. Ceyl. v. 5, p. 222; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1197. *Pogonatherum saccharoideum* var. α. *genuinum*, Hack. Monog. Andropog. in DC. Monog. Phan. v. 6 (1889) p. 193.—Flowers: July.

Kanara: Sampkand (N. Kanara), *Woodrow*.—Distrib. More or less throughout India; Afghanistan, China, Malaya, New Hebrides.

Pogonatherum saccharoideum, Beauv. Agrost. (1812), Expl. des Pl. p. 9, t. 11, fig. 7. *The Bamboo Grass* sometimes grown in gardens, scarcely distinct from *P. crinitum*, which Hackel makes a variety of *P. saccharoideum*. Fl. B. I. v. 7, p. 141; Trim. Fl. Ceyl. v. 5, p. 222; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1197.

26. **LOPHOPOGON,** Hack.

Small perennial densely tufted grasses. Leaves very narrow. Spikes short, solitary, 2-nate or fasciculate at the ends of capillary branches, fragile. Spikelets usually 2-nate at each node of the rhachis; the upper shortly or very shortly pedicellate, 1–2-flowered, aristate from the upper floral glume; the lower spikelet sessile, 2-flowered, not awned from the upper floral glume; lower invol.-glume of both spikelets 3–4-dentate, 5–7-nerved; upper invol.-glume of same 2-dentate, aristate between the teeth; lower floral glume narrow, hyaline, empty or male; upper floral glume hyaline or membranous, that of the upper spikelet with a long awn, that of the lower spikelet awnless. Lodicules 0. Stamens 2. Styles very short; stigmas exserted from the apex of the spikelet.—Distrib. India and Australia; species 3.

1. **Lophopogon tridentatus,** *Hack. in Engl. & Prantl, Pflanzenfam.* v. 2, part 2 (1887) p. 26. Perennial; stems tufted, 4–8 in. high, erect, slender, terete, glabrous. Leaves 2–4 by $\frac{1}{25}$–$\frac{1}{16}$ in., linear, acuminate, rigid, erect, green; sheaths close, quite glabrous, striate, shorter than the internodes, the upper ventricose; ligule very small, truncate, hyaline, ciliate. Heads of racemes erect; sheaths ovoid, flattened, membranous, caudate-acuminate. Racemes usually 2, closely appressed together, appearing like one, $\frac{1}{2}$–$\frac{3}{4}$ in. long, erect, pilose with golden or ferruginous hairs, the peduncle shortly exserted or more or less enclosed in the upper sheath; joints of rhachis very short, slender, glabrous. Spikelets densely imbricate. *Lower spikelets* reaching $\frac{1}{5}$ in. long, brown when dry, obovate-oblong; callus $\frac{1}{30}$ in. long, obtuse, with a small tuft of ferruginous hairs at the very tip. Glumes 4; lower invol.-glume chartaceous, cuneate-oblong, truncate, with 2 long lateral teeth and 1 or 2 shorter ones between, glabrous on the back, 5-nerved; upper invol.-glume $\frac{1}{5}$ in. long, membranous, lanceolate, acute, 3-nerved, hirsute near the apex with ferruginous hairs, and sending out an awn as long as the glume; lower floral glume $\frac{1}{6}$ in. long, narrowly linear, subacute, hyaline, nerveless, glabrous, epaleate; upper floral glume $\frac{1}{6}$ in. long, lanceolate, entire or 2-fid, hyaline, not awned. *Upper spikelets* very shortly pedicellate; lower invol.-glume membranous, 3-toothed, clothed with tufts of long bristles below the middle; upper floral glume with a long awn $\frac{3}{4}$ in. long, geniculate about the middle, the column brown, twisted. Fl. B. I. v. 7, p. 149; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Oct.–Dec.

Dalzell without locality in Herb. Kew.! Konkan: *Law*!, *Stocks*! Deccan: *Woodrow*, 56!; Poona, *Jacquemont*, 541!, *Woodrow*, *Lisboa*; Sholapur, *Stead* ex *Hackel*, *Lisboa*. S. M. Country: Belgaum, *Ritchie*, 882!, *Woodrow*.—Distrib. India (Central Provinces, W. Peninsula).

27. **APOCOPIS,** Nees.

Annual or perennial grasses; stems slender. Leaves narrow, flat. Racemes solitary or 2–3-nate, compressed; rhachis firm, not readily disarticulating; internodes very short, slender, villous. Spikelets secund, closely imbricating in 2 series, solitary, sessile, 1–2-flowered, the lowest 2–4 in each raceme imperfect, neuter; callus very short, acute, bearing the long capillary ciliate pedicel of an obsolete upper spikelet. Glumes 4; lower invol.-glume very large, cuneately obovate or obcordate, chartaceous below, membranous above, more or less villous with pale brown or yellow hairs, 7–9-nerved below the apex, margins incurved at the base only; upper invol.-glume as long as the lower, much narrower, membranous, oblong-ovate, truncate, 3-nerved, the sides broadly incurved; lower floral glume and its hyaline palea oblong, the tips broadly truncate and ciliolate, male or empty; upper floral glume 2-sexual, linear, 2-dentate, 1-nerved, hyaline, paleate, awned; palea half as long as the glume, quadrately oblong, nerveless, truncate with ciliolate tip; awn short, very slender, twisted. Lodicules 0. Stamens 2 or 3; anthers linear. Ovary narrow; stigmas slender, exserted at the top of the spikelet. Grain small, narrowly oblong.—Distrib. Eastern Asia; species 3 or 4.

1. **Apocopis vaginatus,** *Hack. in Œstr. Bot. Zeitschr.* v. 41 (1891) p. 8. A low decumbent annual; stems much branched from the base, 3–8 in. long. Leaves $\frac{3}{4}$–$1\frac{3}{4}$ by $\frac{1}{12}$–$\frac{1}{8}$ in., linear, acute, shorter upwards, hairy from tubercular bases; sheaths lax, longer than the internodes, hairy at the mouth; ligule a small membrane. Racemes 2-nate, $\frac{3}{4}$–$\frac{7}{8}$ in. long, closely appressed together, partly or almost entirely enclosed during flowering in the sheaths of the upper leaves, supported by a short common peduncle, more or less hairy with yellowish-brown hairs; joints much shorter than the spikelets, ciliate. Spikelets oblong, $\frac{1}{8}$ in. long, brown, nearly uniform in color; callus very short, hairy with long brown hairs. Glumes 4; lower invol.-glume $\frac{1}{8}$ in. long, membranous, obovate, truncate or emarginate at the ciliate hyaline apex, densely brown hairy in the lower half, 7–9-nerved, the nerves abruptly ceasing below the apex; upper invol.-glume as long as the lower, quadrate-oblong, truncate at the hyaline margin, hairy in the lower half, 3-nerved, finely ciliolate at the apex; lower floral glume $\frac{1}{8}$ in. long, hyaline, linear-oblong, obtuse, ciliolate at the apex, nerveless; upper floral glume $\frac{1}{8}$ in. long, conspicuously exceeding the other glumes, linear, membranous, truncate and shortly 2-dentate at the apex, awned; awn perfect, $\frac{7}{8}$–$1\frac{1}{4}$ in. long. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437. *A. Wightii* var. *vaginata*, Hook. f. Fl. B. I. v. 7 (1896) p. 143.

Konkan: Kalyan, *Woodrow.* Kanara: N. Kanara, *Talbot* ex *Woodrow.*—Distrib. India (Hazaribagh (Bengal), *C. B. Clarke*).

I have not seen any specimens from the Bombay Presidency.

28. **ARTHRAXON,** Beauv.

Annual or perennial slender grasses; stems decumbent, creeping and branching below. Leaves short, broad, cordate at the base; sheaths shorter than the internodes. Racemes 2-nate, digitate or fasciculate; rhachis very slender, articulate, fragile. Spikelets 1-flowered, secund, sessile, solitary or with an imperfect pedicellate spikelet, laterally com-

pressed, deciduous at the internodes; callus bearded. Glumes 4; lower invol.-glume lanceolate or linear-lanceolate, acute, thin or subcoriaceous, more or less muriculate or aculeate, margins hardly incurved; upper invol.-glume narrower, lanceolate, acuminate, chartaceous, keeled; lower floral glume hyaline, paleate, empty; upper floral glume hyaline, awned or mucronate, bisexual; palea minute or 0. Lodicules 2, cuneate or quadrate. Stamens 1–3. Styles short; stigmas laterally exserted. Grain linear or narrowly fusiform. — DISTRIB. Tropics of the Old World; species 8.

Awn of spikelets less than 1 in. long; joints of rhachis of racemes rectangularly truncate.	
Stamens 3; anthers nearly as long as the upper floral glume.	
Spikelets all sessile (not pedicellate)	1. *A. inermis.*
Spikelets sessile and pedicellate.	
Tall, reaching 3 ft. high; joints of rhachis sparsely hairy; lower invol.-glume acuminate	2. *A. lanceolatus.*
A weak grass reaching 1 ft. high; joints of rhachis densely clothed with silvery hairs; lower invol.-glume 2-fid	3. *A. Meeboldii.*
Stamens 2 or 3; anthers not ½ the length of the upper floral glume.	
Lower invol.-glume 2-fid	4. *A. microphyllus.*
Lower invol.-glume entire	5. *A. ciliaris.*
Awn of spikelets 6 in. or more long; joints of rhachis of racemes obliquely truncate	6. *A. jubatus.*

1. **Arthraxon inermis,** *Hook. f. Fl. Bl. I.* v. 7 (1896) p. 145. Stems very slender, much geniculately branched, glabrous; nodes pubescent. Leaves 1–1½ by ⅜–⅝ in., ovate, broadly amplexicaul, caudate-acuminate with setaceous tips, glabrous or sparsely hairy on both sides, ciliate near the base. Spikes often 3, short, green; peduncle slender, naked. Spikelets oblong-lanceolate, all sessile (none pedicellate), rather distant. Glumes 3 or 4; lower invol.-glume dorsally convex, obtuse, oblong-lanceolate, strongly 7–9-nerved, the margins not incurved and as well as the nerves scabrid; upper invol.-glume as long as the lower, obovate-oblong (when spread out), obtuse, emarginate, apiculate, 3-nerved, hardly keeled, nearly smooth; lower floral glume 0 (or palea of upper floral glume) shorter than the upper invol.-glume, lanceolate; awn basal, twice as long as the spikelets. Anthers very large. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Oct. VERN. *Vanguarin.*

KONKAN: Matheran, *Woodrow.* DECCAN: *Woodrow,* 189!; Mahableshwar, *Woodrow.* —DISTRIB. India (W. Peninsula).

There is a single and not very good specimen in Herb. Kew. collected by Woodrow and ticketed "Deccan." I have seen no other. The grass seems to be procurable at Matheran and Mahableshwar, both places of easy access, and a few specimens would be highly acceptable at Kew.

2. **Arthraxon lanceolatus,** *Hochst. in Flora,* v. 29 (1856) p. 188. A tall much-branched suberect or subscandent grass 1–3 ft. high; stems slender, quite glabrous or scaberulous below the nodes: floriferous branches usually elongate, solitary or twin. Leaves glaucous, very variable, from broadly ovate and ½–3 by ¼–1¼ to narrowly lanceolate and 1–4 by ⅛–½ in., caudate-acuminate, flaccid or rigid, glabrous or hairy, the margins ciliate with stiff hairs, the nerves slender, obscure; sheaths close; ligule ½–1½ in. long, rounded, membranous. Racemes 2–5-nate,

1–2 in. long, pale green or suffused with violet; rhachis sparsely hairy; joints about ½ as long as the spikelets. *Sessile spikelets* ¼ in. long (not including the awn), linear-lanceolate; callus very short, not bearded. Glumes 4; lower invol.-glume ¼ in. long, lanceolate, acuminate, coriaceous, often purplish with a hyaline tip, the keels serrately bristly with strong curved teeth, the back convex, glabrous or muriculate, 5–7-nerved, with incurved margins; upper invol.-glume similar, lanceolate, acuminate or mucronulate, 3-nerved, with incurved margins; lower floral glume ⅙ in. long, acute, glabrous, membranous; upper floral glume hyaline; awn ½–⅝ in. long, basal, the column equalling the subulate portion. Anthers more than ⅛ in. long. *Pedicellate spikelets* ⅕ in. long, linear-lanceolate. Stamens perfect. Fl. B. I. v. 7, p. 143; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1198.—Flowers: Oct. VERN. *Harjala*; *Govinder*.

DECCAN: Lanoli, *Woodrow*. GUJARAT; Morvi (Kathiawar), *Woodrow*. SIND: *Stocks*, 642!—DISTRIB. More or less throughout India; Abyssinia, Tonkin, China.

3. **Arthraxon Meeboldii,** *Stapf, MS.* Annual; stems 2–3 from the base, shortly prostrate, ascending, 6–12 in. long, slender, terete, quite glabrous, often tinged with purple; nodes pubescent. Leaves ¾-2 by ¼-¾ in., ovate lanceolate, finely acuminate, very sparsely hairy with slender bulbous-based hairs, green above, glaucous beneath, ciliate on the margins with bulbous-based hairs, base cordate, amplexicaul; sheaths of the lower leaves loose, the others close or the upper more or less tumid, at first enclosing the panicles, glabrous or with a few scattered hairs and more or less ciliate margins; ligule about 1/20 in. long, quadrate, hyaline, shortly ciliate at the apex. Inflorescence of paniculate racemes at the apex of the stems; branches 2–4, reaching 2 in. long; joints of the rhachis about ⅛ in. long, densely clothed with long silvery hairs; pedicels ⅕ in. long, broad. *Sessile spikelets* ¼–⅜ in. long, narrowly linear-lanceolate; callus minute, bearded. Glumes 4: lower invol.-glume when young sometimes silky all over with a deciduous tomentum, linear-lanceolate, chartaceous, with a purplish 2-fid acumen with very narrow teeth and with incurved margins, keels serrately muricate from the base up to ¾ of their length, the murications passing into tubercles which, in the upper third of the glume, are ciliate with fine erect silky hairs; upper invol.-glume oblong-lanceolate, setosely acuminate, membranous, equalling the lower one, 3-nerved, with hyaline margins; lower floral glume empty, elliptic-oblong, subobtuse, ⅛ in. long, nerveless; upper floral glume linear-lanceolate, acute, rather more than ⅛ in. long, hyaline, aristate from near the base, the awn ½ in. long or more. *Pedicellate spikelets* closely appressed to the sessile ones, lanceolate, acute, chartaceous, shorter than the sessile spikelets; lower invol.-glume with rigidly ciliate keels, otherwise glabrous, 9-nerved; upper invol.-glume lanceolate, acute, 3-nerved; lower floral glume empty, ovate-oblong, hyaline, ⅙ in. long; upper floral glume ovate, 2-dentate, equalling the lower, mucronulate between the teeth, hyaline, male. Anthers ⅛ in. long, bright yellow.—Flowers: Sept.

The long silky silvery hairs on the racemes are a good distinctive mark of the species.

DECCAN: Khandala, *Meebold*, 9132; Mahableshwar, *Cooke*!—DISTRIB. India (W. Peninsula).

4. **Arthraxon microphyllus,** *Hochst. in Flora*, v. 29 (1856) p. 188. Annual; stem and branches filiform, 6–12 in. long, straggling, glabrous or more or less obscurely pubescent below the spikes. Leaves $\frac{3}{4}$–$1\frac{1}{4}$ by $\frac{1}{6}$–$\frac{1}{3}$ in., ovate or elliptic, acuminate, membranous, very sparingly hairy or nearly glabrous, base slightly auricled, margins naked or sparsely ciliate especially towards the base; sheaths short, glabrous; ligule small, hyaline. Panicle of 3–5 slender branches; rhachis capillary; internodes shorter than the slender spikelets, usually ciliate with long erect hairs (rarely glabrous). Spikelets solitary (rarely with a pedicellate one), $\frac{1}{8}$ in. long, narrowly lanceolate; callus nearly glabrous. Glumes 4; lower involucre-glume thinly membranous, lanceolate, 2-cuspidate, 5–7-nerved above the middle, the nerves usually scabrid; upper involucre-glume as long as the lower, narrowly lanceolate, narrowing out into a very fine awn-like point $\frac{1}{50}$–$\frac{1}{30}$ in. long; lower floral glume much shorter than the upper involucre-glume, lanceolate, acuminate, epaleate; upper floral glume $\frac{1}{20}$ in. long, ovate-lanceolate, subacute, hyaline, with an awn about $\frac{3}{8}$ in. long from near the base, the column of the awn brown, much shorter than the usually purplish capillary subulate portion. Fl. B. I. v. 7, p. 147; Trim. Fl. Ceyl. v. 5, p. 224; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1199.—Flowers: Sept.

Konkan: Salsette, *Jacquemont*, 713!; Parel (Bombay), *Woodrow*. Gujarat: Surat, *Cooke*!—Distrib. More or less throughout India; Ceylon, Tonkin, Tropical Africa.

5. **Arthraxon ciliaris,** *Beauv. Agros.* (1812) p. 111, t. 11, fig. 6. Stems tall or short, tufted or branched from the base, or with long creeping stems and ascending leafy branches, glabrous. Leaves 1–$2\frac{1}{2}$ by $\frac{3}{8}$–$\frac{7}{8}$ in., ovate to lanceolate, glabrous or laxly hairy, the margins ciliate towards the base; sheaths with ciliate margins. Racemes few or many, on long naked or spathaceously sheathed glabrous peduncles, pale green or purplish. Spikelets $\frac{1}{8}$–$\frac{1}{5}$ in. long, lanceolate or linear-lanceolate; callus naked or shortly bearded. Glumes 4; lower involucre-glume chartaceous, ovate-lanceolate (when spread out), acute, 7–10-nerved, the nerves minutely aculeolate, often punctulate; upper involucre-glume as long as the lower, linear, acute, 3-nerved; lower floral glume much shorter than the upper involucre-glume, ovate-oblong, acuminate, nerveless; upper floral glume about $\frac{1}{2}$ as long as the upper involucre-glume, awned; awn subbasal, about twice as long as the spikelet. Fl. B. I. v. 7, p. 145; Trim. Fl. Ceyl. v. 5, p. 225; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Prain, Beng. Pl. p. 1199.—Flowers: Oct.

S. M. Country: Belgaum, *Ritchie*, 796 *a*! Gujarat: Chamargaon, *Woodrow*.—Distrib. Throughout India in hilly districts; Ceylon.

A very variable species of which Hackel (Monog. Andropog. p. 354) recognizes no less than 12 forms. These, however, for the Indian species Sir Joseph Hooker has reduced to four. There is only one specimen from Bombay in Herb. Kew., obtained by *Ritchie* from Belgaum, and this has been included by Sir J. Hooker in his group *Violaceus*.

6. **Arthraxon jubatus,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 358. Annual; stems decumbent, then ascending, 4–12 in. long, very slender, terete, quite glabrous, leafy almost to the apex. Leaves $\frac{7}{8}$–$1\frac{3}{4}$ by $\frac{1}{6}$–$\frac{1}{3}$ in., lanceolate, acute, flat, thinly membranous, green, undulate, densely pubescent or almost villous on both surfaces,

base subcordate, amplexicaul; sheaths lax, pubescent, the upper spathiform, leafless; ligule very short, truncate, hyaline, glabrous. Floral spathes 1½–2 in. long, linear-lanceolate, acuminate, green, with membranous margins, pubescent or villous, enclosing the spikes. Racemes 2-nate, on a common peduncle, a subsessile and a pedicellate one; the pedicel slender, pubescent, fragile; joints ½ as long as the spikelets and pedicels of upper spikelet clavate, compressed, pectinately ciliate. Spikelets 2-nate, a sessile and a pedicellate one at each joint, and a terminal male. *Sessile spikelets* ⅜ in. long, linear-lanceolate; callus $\frac{1}{20}$ in. long, bearded with hairs equalling itself. Glumes 4; lower invol.-glume membranous, linear, acute, bimucronulate, 2-nerved, the margins hyaline, inflexed; upper invol.-glume rather shorter than the lower, linear-lanceolate, mucronulate, much compressed, 1-nerved, with hyaline margins; lower floral glume ⅛ in. long, narrow, linear, subacute, hyaline, nerveless, glabrous; upper floral glume ½ as long as the upper invol.-glume, lanceolate, acute, glabrous, with a very long capillary awn reaching 6 in. (or more) long, attached at the base; palea 0. Anthers $\frac{1}{20}$ in. long. *Pedicellate spikelets* ⅛ in. long, not awned. Fl. B. I. v. 7, p. 147; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Oct.

KONKAN: *Law!*, *Stocks!* DECCAN: *Woodrow*, from seed sown in the Botanical Garden of the College of Science, Poona, collected at Kori Fort, 12 miles S. of Lanoli. —DISTRIB. India (W. Peninsula).

29. **THELEPOGON,** Roth.

A coarse perennial grass. Leaves lanceolate, cordate, amplexicaul. Racemes few or many, corymbosely fascicled, pedunculate; rhachis flexuous, fragile, the joints more or less deeply excavated. Spikelets ovoid, acute, solitary at the joints, the upper spikelet reduced to a mere almost glume-like rigid pedicel, the lower sessile, 2-flowered, the lower flower male, the upper 2-sexual. Glumes 4; lower invol.-glume coriaceous, transversely rugose, ridged or tuberculate; upper invol.-glume chartaceous, not keeled, sunk in the cavity of the joint, rigid, sparingly tuberculate; lower floral glume shorter, paleate, usually male, triandrous, with a similar palea; upper floral glume hyaline, 2-cleft, with a long twisted awn in the sinus, 3-nerved; palea narrow, equalling the glume. Lodicules cuneate, truncate. Stamens 3; anthers long. Styles free; stigmas short.—DISTRIB. Species 1, African and East Indian.

1. **Thelepogon elegans,** *Roth, Nov. Pl. Sp.* (1821) p. 62. An annual robust grass; roots stout, rigid; stems 1–3½ ft. high, tufted and branching from the base, terete, erect or geniculately ascending, glabrous. Leaves 4–10 by ⅜–¾ in., linear, acuminate, thin, cordate, amplexicaul, usually hispid with bulbous-based hairs or sometimes only tuberculately scabrid, the margins cartilaginously ciliate; sheaths loose, hispid above with bulbous-based hairs and with ciliate margins; ligule narrow, membranous. Racemes 1–2 in. long, corymbose; peduncles slender, stiff; joints of the rhachis as long as the spikelets, subclavate, scaberulous, the top orbicular, cupular. Spikelets ¼ in. long, yellowish-white, ovate, beaked; callus small, annular, minutely bearded. Glumes 4; lower invol.-glume thickly coriaceous, ovate, acuminate, with a membranous 2-dentate beak, the back convex with transverse much elevated

ridges, translucent; upper invol.-glume slightly longer than the lower, broadly lanceolate, chartaceous, with a long acumen, the back flat or subconvex, with 5–7 short transverse ridges; lower floral glume $\frac{1}{5}$ in. long, lanceolate, hyaline, 2-nerved, glabrous, the palea narrow, acute, nerveless; upper floral glume $\frac{1}{5}$ in. long, ovate-lanceolate, hyaline, cleft to the middle, glabrous, 3-nerved, the lateral nerves running into the acute lanceolate lobes; awn inserted at the sinus, $\frac{3}{4}$–1 in. long, the column brown, twisted, equalling the yellow subulate portion; palea equalling the glume, oblong, acuminate. *Pedicel* of the obsolete upper spikelet longer than the sessile spikelet, linear, obtuse, curved, flat, ciliate on one margin. Fl. B. I. v. 7, p. 148; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.—Flowers: Sept.

KONKAN: *Stocks*!, *Law*! DECCAN: Poona. *Woodrow*; Hewra, *Dalzell*!; near Nasik, *Edgeworth*! S. M. COUNTRY: Belgaum, *Ritchie*, 812!—DISTRIB. India (Central India, W Peninsula); Tropical Africa.

30. **ELIONURUS,** Humb. & Bonpl.

Aromatic cæspitose grasses, usually perennial. Raceme solitary, subsimple, clothed with silky hairs; rhachis fragile, jointed, flattened. Spikelets 2-nate (one sessile, the other pedicellate). *Sessile spikelets* dorsally compressed, 1-flowered. Glumes 4; lower invol.-glume subcoriaceous, often 2-toothed or 2-fid, dorsally flattened, 2-keeled, usually with fine filiform transparent oil-glands close to the ciliate keels; upper invol.-glume membranous, lanceolate, acute, not awned; lower floral glume hyaline, empty, paleate or not; upper floral glume small, hyaline, awnless, paleate or not. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exserted. Grain dorsally compressed, oblong.—DISTRIB. Species about 15, in the tropical and subtropical regions of both hemispheres.

Annual; lower invol.-glume of sessile spikelet with penicillate tubercles on the margin, the floral glumes not paleate	1. *E. Royleanus.*
Perennial; margins of lower invol.-glume of sessile spikelet not tuberculate, the floral glumes paleate	2. *E. hirsutus.*

1. **Elionurus Royleanus,** *Nees, ex A. Rich. Tent. Fl. Abyss.* v. 2 (1851) p. 471. Annual; stems 3–12 in. high, slender, leafy, geniculate; nodes pubescent. Leaves 1½–4 by $\frac{1}{20}$ in., linear-lanceolate, acute or acuminate, rigid, suberect, at first green then together with the whole plant turning red, glabrous or sparsely hairy, fimbriate at the base; lower sheaths terete, much shorter than the internodes, the upper spathiform; ligule very short, membranous. Racemes 1–2 in. long, erect, yellowish-green or often variegated with purple, each enclosed in a long narrow flattened sheath; joints densely bearded at the apex with long white silky hairs, obliquely disarticulating, shorter than the sessile spikelets. *Sessile spikelets* nearly $\frac{1}{2}$ in. long (including the beak); callus about $\frac{1}{30}$ in. long, densely bearded. Glumes 4; lower invol.-glume coriaceous, nearly $\frac{1}{2}$ in. long (including beak), running out into a usually violet-colored, 2-fid beak about $\frac{1}{4}$ in. long, the lobes ciliate, linear, slightly divergent, the margins of the glume below the beak with a row of large violet-colored tubercles each carrying a pencil of whitish glistening hairs; upper invol.-glume as long as the body of the lower, linear-lanceolate, acuminate, finely mucronate, membranous, 1-nerved; lower floral glume

a little shorter than the invol.-glumes, oblong, acute, nerveless, glabrous, epaleate; upper floral glume much shorter than the lower, oblong, obtuse, nerveless. *Pedicellate spikelets*: pedicels $\frac{1}{8}$ in. long, ciliate on one margin. Spikelets linear-subulate. Lower invol.-glume $\frac{3}{8}$ in. long, narrowed almost from the base into a long narrow linear ciliate beak; upper invol.-glume $\frac{1}{4}$ in. long, ovate-lanceolate, concave, membranous, narrowed into a short scabrid purplish awn. Fl. B. I. v. 7, p. 161; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437.

GUJARAT: Rajkot (Kathiawar), *Woodrow*. SIND: *Woodrow*.—DISTRIB. India (Upper Gangetic plain, W. Peninsula); Arabia, Abyssinia, Cape de Verd Islands.

2. **Elionurus hirsutus,** *Munro, ex Benth. in Journ. Linn. Soc.* v. 19 (1881) p. 68. Perennial; rootstock woody, branched; stems 1–2 ft., ascending from a branching base, stout, smooth, rigid, more or less scabrid or pubescent; nodes pubescent. Leaves 3–6 by $\frac{1}{16}$–$\frac{1}{8}$ in., linear, finely acuminate: sheaths terete, glabrous or nearly so, the upper sheaths shorter than the internodes, glaucous or nearly white. Raceme solitary, stout, 2–4 in. long, silvery silky all over; joints shorter than the sessile spikelets, subclavate, densely villous on the back. *Sessile spikelets* at each node of the rhachis, solitary or 2-nate, imbricate, reaching $\frac{3}{8}$ in. long or more (including the beak), pale green. Glumes 4; lower invol.-glume $\frac{3}{8}$ in. long (including beak), coriaceous, 7–9-nerved, the beak often as long as the body of the glume, deeply 2-fid, densely silky-villous, the lobes divergent; upper invol.-glume $\frac{1}{4}$ in. long, ovate, aristately acuminate, chartaceous, 3–5-nerved, the acumen ciliate at the tip; lower floral glume equalling the upper invol.-glume, hyaline, ovate-oblong, acute, 3-nerved, paleate, the palea lanceolate, acute, as long as the glume; upper floral glume shorter, ovate, acute, glabrous, with incurved margins. *Pedicellate spikelets* rather shorter than the sessile ones; pedicels about $\frac{1}{8}$ in. long, shorter than the joints, flattened, subclavate, hairy on the back and with ciliate margins. Fl. B. I. v. 7, p. 162; Boiss. Fl. Orient. v. 5, p. 466; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 437; Watt, Dict. Econ. Prod. v. 3, p. 242. *Rottboellia hirsuta*, Vahl, Symb. part 1 (1790) p. 11; Hack. Monog. Andropog. in DC. Monog. Phan. v. 6 (1889) p. 311.

Dalzell without locality in Herb. Kew.! SIND: *Stocks*, 626!—DISTRIB. India (Panjáb, Rajputana, W. Peninsula); westwards to N. Africa.

31. **ANDROPOGON,** Linn.

Perennial or annual grasses of very varied habit. Leaves usually narrow. Spikelets similar or heteromorphous, 2-nate (one sessile, the other pedicellate), on the fragile rhachis of solitary, 2-nate, digitate fasciculate or paniculate racemes. *Sessile spikelets* 1-flowered; callus long or short. Glumes 3 or 4; lower invol.-glume coriaceous or chartaceous, 2-keeled, muticous; upper invol.-glume usually thinner with a median keel, rarely awned; lower floral glume hyaline or 0, neuter; upper floral glume hyaline, usually awned, often reduced to the dilated base of the awn, 2-sexual; palea various or 0. Lodicules 2, cuneate. Stamens 3–1. Stigmas laterally exserted. Grain various. *Pedicellate spikelets* usually smaller than the sessile.—DISTRIB. Species more than 200, in the warm parts of the world.

Internodes of racemes deeply cupped at the apex.

Subgenus 1. CYMBOPOGON. Racemes 2-nate, terminal on the stems, both together subtended by spathiform sheaths; spikelets differing in sex and form.

Roots aromatic ..... 1. *A. Iwarancusa.*

Subgenus 2. ARTHROLOPHIS. Racemes 2-nate (1 sessile, the other pedunculate), from spathiform sheaths; sessile spikelets alike in sex and form; joints opaque.

Cupular tips of joints toothed ..... 2. *A. pumilus.*

Internodes of racemes truncate but not cupped at the apex.

SECT. A. ISOZYGI. Sessile spikelets of all the pairs alike in sex and form.

Subgenus 3. HYPOGYNIUM. Raceme solitary, pedunculate, in the axil of a spathiform leaf-sheath; joints and pedicels obliquely truncate at the apex, opaque; pedicellate spikelets like the sessile.

Lower invol.-glume pitted ..... 3. *A. foveolatus.*

Subgenus 4. AMPHILOPHIS. Racemes 2 or more, fasciculate or paniculate, all pedunculate; joints of the raceme many to few, like the pedicels, linear, compressed, with a translucent median channel and thickened margins (except *A. concanensis*).

Racemes with many pairs of spikelets.
  Racemes digitate or fasciculate, not panicled, the lower longer than the rhachis of the inflorescence.
    Lower invol.-glume of sessile spikelets villous below the middle.
      Lower invol.-glume not pitted.
        Upper invol.-glume mucronulate ..... 4. *A. compressus.*
        Upper invol.-glume obtuse ..... 5. *A. Woodrowii.*
      Lower invol.-glume pitted ..... 6. *A. pertusus.*
    Lower invol.-glume of sessile spikelets glabrous below the middle (sparsely silky in *A. ensiformis*).
      Nodes of stem densely bearded ..... 7. *A. Kuntzeanus.*
      Nodes of stem glabrous.
        Leaves reaching ½ in. broad ..... 8. *A. ensiformis.*
        Leaves reaching ⅛ in. broad ..... 9. *A. concanensis.*
  Racemes panicled, the lower branches shorter than the rhachis of the inflorescence.
    Non-odorous; sheaths terete ..... 10. *A. intermedius.*
    Aromatic; sheaths compressed ..... 11. *A. odoratus.*
Racemes small, of 1-3 pairs of spikelets, often reduced to 3 spikelets, 1 sessile and 2 pedicellate.
  Stems more or less suffrutescent below, stiff, erect.
    Stems often proliferously branched; nodes of stem glabrous; leaves reaching ¼ in. broad; callus shortly bearded ..... 12. *A. assimilis.*
    Stems not proliferously branched; nodes of stem bearded; leaves reaching ⅛ in. broad; callus densely villous ..... 13. *A. Hugelii.*
  Stems decumbent and interlaced, very weak, filiform. 14. *A. filiculmis.*

Subgenus 5. SORGHUM. Racemes panicled, all pedunculate; rhachis

fragile; joints 1 or few, filiform, truncate, with ciliate margins; sessile spikelets dorsally compressed.

Perennial; stems up to 15 ft. high; leaves 1–2 ft. by ¾–2 in.; joints 3–7 ..... 15. *A. halepensis.*
Annual; stems less than 5 ft. long; leaves 8–10 by ¼–⅓ in.; joints rarely 3 ..... 16. *A. purpureo-sericeus.*

Subgenus 6. CHRYSOPOGON. Raceme solitary, 1-jointed (*i. e.* reduced to 1 sessile, 2-sexual, and 2 pedicellate male or neuter spikelets), on the bearded tips of the branches of the panicle; sessile spikelets laterally compressed.

Pedicels of the upper spikelets ½ as long as the sessile spikelets or longer.
  Pedicels of upper spikelets glabrous or nearly so ..... 17. *A. aciculatus.*
  Pedicels of upper spikelets ciliate with long reddish-brown hairs ..... 18. *A. lancearius.*
Pedicels of upper spikelets not ½ as long as the sessile spikelets.
  Stems reaching 4 ft. high; leaves up to 18 in. long; callus $\frac{1}{10}$ in. long, bearded on one side only ..... 19. *A. Monticola.*
  Stems reaching 18 in. high; leaves up to 4 in. long; callus $\frac{1}{16}$ in. long, villous all over ..... 20. *A. Aucheri.*

SECT. B. HETEROZYGI. Lowest one or more sessile spikelets in all racemes, or at least in one or two, differing from those above it in sex and form.

Subgenus 7. DICHANTHIUM. Racemes digitate (rarely solitary or paniculate); spikelets all alike in form, but differing in sex; lower 1–4 pairs of spikelets usually homogamous.

Raceme solitary, less than 1 in. long ..... 21. *A. Cookei.*
Racemes digitate (sometimes solitary in *A. caricosus*), 1 in. or more long.
  Lower invol.-glumes of the pedicellate spikelets armed with submarginal tubercular-based bristles ¼ in. long ..... 22. *A. armatus.*
  Lower invol.-glume not armed with marginal bristles.
    Pedicels ½ as long as the sessile spikelets; nodes of stem glabrous; ligule a shortly ciliate small membrane ..... 23. *A. caricosus.*
    Pedicels ½ as long as the sessile spikelets; nodes of stem bearded; ligule large, oblong, obtuse, membranous ..... 24. *A. annulatus.*

Subgenus 8. HETEROPOGON. Raceme solitary, terminal on the stems and branches; lower sessile spikelets very unlike the upper, which are cylindric.

A dwarf erect grass not 1 ft. high ..... 25. *A. polystachyos.*
Tall grasses reaching several feet high.
  Lower invol.-glume dorsally deeply grooved; ligule a rounded membrane ..... 26. *A. triticeus.*
  Lower invol.-glume not dorsally grooved.
    Margins of lower invol.-glume of pedicellate spikelets equally winged, the keels studded with long yellow bristles; ligule of several narrow membranous segments ..... 27. *A. Ritchiei.*
    Margins of lower invol.-glume of pedicellate spikelets unequally winged, the keels not studded with bristles; ligule truncate, ciliolate ..... 28. *A. contortus.*

1. **Andropogon Iwarancusa,** *Jones, in Asiatic Research.* v. 4 (1795) p. 109. Whole plant of a pale often glaucous green, perennial; stems up to 6 ft. high, tufted on an annulate creeping rootstock; roots aromatic. Leaves flat or convolute, 6 in. to 2 ft. by $\frac{1}{10}$–$\frac{3}{8}$ in., linear with capillary tips, rigid or flexuous, glabrous or scaberulous, midrib slender; sheaths glabrous, the lower deciduous, splitting into flat often tortuous laminæ; ligule shortly oblong, membranous, ciliolate. Panicle very variable; branches distant or crowded, simple or branched; proper spathes $\frac{1}{3}$–$\frac{2}{3}$ in. long, longer than the peduncles of the racemes, narrowly lanceolate; racemes $\frac{1}{4}$–$\frac{3}{4}$ in. long, unequal; joints of rhachis and pedicels of upper spikelets subclavate, densely villous with long hairs, the hairs more or less concealing the sessile spikelet, the tops cupular, toothed; spikelets 3 or 4 pairs. *Sessile spikelets* reaching $\frac{1}{4}$ in. long, linear-lanceolate, acute; callus acute, densely bearded with long whitish hairs. Glumes 4; lower invol.-glume $\frac{1}{5}$ in. long, linear-lanceolate, thin, flat, glabrous, nerveless, keels scaberulous; upper invol.-glume $\frac{1}{6}$ in. long, ovate, acute, cymbiform, thinly membranous, 3-nerved; lower floral glume $\frac{1}{6}$ in. long, linear-oblong, obtuse, hyaline, 2-nerved; upper floral glume $\frac{1}{20}$ in. long, 2-fid, hyaline, ciliate; awn from the sinus $\frac{1}{3}$ in. long, slender, glabrous. *Pedicellate spikelets* scarcely longer than the sessile, narrowly lanceolate, purplish; pedicels $\frac{1}{10}$ in. long; lower invol.-glume 7–9-nerved, glabrous, with scaberulous keels; upper invol.-glume ovate-oblong, obtuse, 3-nerved, ciliate; lower floral glume oblong, obtuse, hyaline, ciliate. Fl. B. I. v. 7, p. 203; Grah. Cat. p. 238; Dalz. & Gibs. p. 301; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1200. *Andropogon laniger*, Watt, Dict. Econ. Prod. v. 1, p. 244 (partly).—Flowers: Dec.

GUJARAT: Ahmedabad, *Dalzell & Gibson.* SIND: Karachi, *Dalzell & Gibson, Woodrow.*

VAR. *laniger*, Hook. f. Fl. B. I. v. 7 (1896) p. 203. Stem short, subsimple; leaves junciform; lower sheaths hardened, persistent; panicle narrow, subsimple. *Andropogon laniger*, Desf. Fl. Atlant. v. 2 (1800) p. 379.—Flowers: July–Dec.

SIND: widely, *Woodrow, Stocks,* 816!; Jemadar ka Landa near Karachi, *Stocks!*

2. **Andropogon pumilus,** *Roxb. Fl. Ind.* v. 1 (1832) p. 273. Annual; stem 6–18 in. high, slender, suberect or geniculate and decumbent below, quite glabrous; nodes glabrous. Leaves 3–5 by $\frac{1}{10}$–$\frac{1}{6}$ in., linear, finely acuminate, glabrous; sheaths compressed, keeled, quite glabrous; ligule short, truncate; membranous, glabrous. Racemes $\frac{1}{2}$–$\frac{3}{4}$ in. long, in nearly equal pairs on a very slender peduncle which arises from a narrow flattened glabrous spathe $\frac{1}{4}$–$\frac{1}{2}$ in. long; joints $\frac{1}{10}$ in. long, very slightly clavate (almost linear), flattened, glabrous and often red on the back, with densely ciliate margins and a cup-shaped 2–3-toothed apex. *Sessile spikelets* reaching $\frac{1}{5}$ in. long; callus glabrous. Glumes 4; lower invol.-glume $\frac{1}{5}$ in. long, linear-lanceolate, acuminate, membranous, 2-cuspidate, the keels strong, running into the slender awns about $\frac{1}{30}$ in. long; upper invol.-glume as long as the lower, narrowly lanceolate, mucronate, coriaceous, 1-nerved; lower floral glume hardly $\frac{1}{8}$ in. long, linear-lanceolate, subacute, hyaline; upper floral glume $\frac{1}{10}$ in. long, narrowly linear, hyaline, cleft at the apex into 2 subulate lobes with an awn in the sinus between them; awn reaching $\frac{5}{8}$ in. long,

geniculate about the middle; the lower half brown, the upper white. Anthers $\frac{1}{12}$ in. long. *Pedicellate spikelets* not awned; pedicels $\frac{1}{8}$ in. long with ciliate margins. Glumes 3; lower involucre-glume $\frac{1}{6}$ in. long, ovate-lanceolate, acuminate, 5-nerved. Fl. B. I. v. 7, p. 170; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438. *Andropogon pachyarthrus*, Hack. Monogr. Andropog. in DC. Monogr. Phan. v. 6 (1889) p. 449.—Flowers: Dec. VERN. *Baerki*; *Gondval*.

There is an excellent drawing of this grass in *Icones Roxburghianæ* in Herb. Kew. No. 2020.

DECCAN: Khandesh, *Lisboa*. KANARA: Karwar, *Lisboa*. GUJARAT: Surat, *Dalzell!*, *Woodrow*.—DISTRIB. India (Nepal, Rajputana, Central Provinces, W. Peninsula).

3. **Andropogon foveolatus,** *Del. Descrip. de l'Egypte* (1812) p. 160, t. 8, fig. 2. Stems 1–2 ft. long, densely tufted, usually decumbent at the base, then geniculately ascending, very slender, glabrous; nodes bearded. Leaves 3–6 by $\frac{1}{20}$–$\frac{1}{10}$ in., linear, scaberulous beneath; sheaths shorter than the internodes, scabrous or glabrous, the basal sheaths silky-villous; ligule short, truncate, hyaline, ciliate. Racemes 1–1½ in. long, solitary; peduncles capillary, erect, usually far exserted beyond the slender spathe; joints and pedicels slender, ciliate on 2 opposite sides with long silky hairs, shorter than the sessile spikelets. Spikelets $\frac{1}{6}$ in. long (the sessile and pedicellate equal), oblong-lanceolate, glabrous, purplish; callus small, shortly hairy at the base; lower involucre-glume $\frac{1}{6}$ in. long, flat, lanceolate-oblong, subobtuse, with narrowly involute margins, 4-nerved, usually marked with a deep pit above the middle; upper involucre-glume equal to the lower, lanceolate, acute, obscurely 3-nerved; lower floral glume much shorter, oblong-lanceolate, glabrous, nerveless; upper floral glume reduced to an awn $\frac{1}{2}$–$\frac{5}{8}$ in. long, the column about equalling the subulate portion. Anthers $\frac{1}{10}$ in. long. *Pedicellate spikelets*: pedicels $\frac{1}{10}$ in. long. Glumes 2; lower involucre-glume $\frac{1}{6}$ in. long, lanceolate, acute, with slightly incurved margins, the keels above aculeately scabrid, 5-nerved, pitted or not; upper involucre-glume equalling the lower, linear-lanceolate, acute, 3-nerved. Fl. B. I. v. 7, p. 168; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1201.—Flowers: Oct. VERN. *Ghandel*.

DECCAN: Poona, *Cooke!*, *Woodrow*, *Jacquemont*, 454!; Khandesh, *Lisboa*.—DISTRIB. Throughout the drier parts of India; westwards to the Cape Verd Islands.

4. **Andropogon compressus,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 172. A tall grass reaching 3–4 ft. high; stem as thick as a goose-quill at the base, erect, sparingly branched, leafy; nodes glabrous. Leaves 12–18 by $\frac{1}{4}$–$\frac{3}{8}$ in., linear, finely acuminate, flat, slightly scaberulous on both surfaces and on the margins, more or less hairy towards the base; sheaths strongly compressed and acutely keeled; ligule a glabrous membrane $\frac{1}{10}$ in. long. Panicles 4–5 in. long, of many subcorymbosely arranged pale flexuous silky racemes 1–2 in. long; joint $\frac{1}{10}$ in. long, slender, with a central translucent line, ciliate on 2 opposite sides with long silky hairs. *Sessile spikelets* $\frac{1}{5}$ in. long, ovate-lanceolate; callus bearded with long hairs; lower involucre-glume ovate-lanceolate, $\frac{1}{5}$ in. long, villous on the back below the middle, truncate or notched at the apex, with narrowly incurved margins and a hyaline tip, 5–7-nerved, not pitted; upper involucre-glume ovate, acute, mucronulate,

as long as the lower; lower floral glume $\frac{1}{6}$ in. long, linear-lanceolate, obtuse, hyaline, nerveless; upper floral glume represented by an awn reaching $\frac{5}{8}$ in. long, inconspicuously margined for $\frac{1}{10}$ in. at the base. *Pedicellate spikelets*: pedicels $\frac{1}{8}$ in. long, ciliate on 2 opposite sides with long silky hairs, very slender and with a central translucent line; lower invol.-glume 9–11-nerved; upper invol.-glume 3-nerved; lower floral glume oblong, obtuse, ciliolate, hyaline, nerveless. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Dec.

DECCAN: *Lisboa*, 6 (*A. odoratus*)!; Mâwal, *Woodrow*!; Poona, *Woodrow*.—DISTRIB. India, W. Peninsula, apparently endemic.

5. **Andropogon Woodrowii,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 173 (by misprint *Woodrovii*). A grass with a camphoraceous odor (*Woodrow*); rootstock woody; stems tufted, 3–4 ft. long, erect, compressed, thicker than a goose-quill at the base, obtusely 2-edged, solid, stiff, branched above; nodes glabrous. Leaves 12–24 by $\frac{1}{8}$–$\frac{1}{6}$ in., rigid, scaberulous on both surfaces and the margins; sheaths loose, keeled, quite smooth; ligule $\frac{1}{10}$ in. long, membranous, truncate, ciliate. Racemes 3–5, pale, $\frac{1}{2}$–1 in. long, on slender, stiff, smooth proper peduncles $\frac{1}{8}$–$\frac{1}{2}$ in. long, erect, silky; joints of the rhachis and the pedicels linear, with silky margins and a translucent centre, the hairs at the top $\frac{1}{2}$ as long as the spikelet. *Sessile spikelets* $\frac{1}{6}$ in. long, oblong-lanceolate; callus $\frac{1}{30}$ in. long, bearded; lower invol.-glume coriaceous, not pitted, ovate-oblong, truncate and hyaline-tipped at the apex, many-nerved, margins narrowly incurved, keels ciliolate; upper invol.-glume chartaceous, 3-nerved, oblong, subobtuse, as long as the lower; lower floral glume $\frac{1}{8}$ in. long, ovate-oblong, obtuse, hyaline, nerveless; upper floral glume reduced to an awn $\frac{5}{8}$ in. long with a hyaline flattened base $\frac{1}{10}$ in. long. *Pedicellate spikelets* rather narrower than the sessile; lower invol.-glume glabrous on the back; upper invol.-glume narrow, linear, acute; awn 0. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Dec.

DECCAN: Khorbasa (Mâwal districts), *Woodrow*; Paud, 20 miles west of Poona, *Woodrow*!—DISTRIB. India (W. Peninsula), apparently endemic.

6. **Andropogon pertusus,** *Willd. Sp. Pl.* v. 4 (1805) p. 922. Stem 1–2 ft. long, erect or geniculately ascending, leafy upwards, simple or sparingly branched; nodes bearded with spreading hairs. Leaves up to 1 ft. by $\frac{1}{8}$–$\frac{1}{6}$ in., narrowly linear, acute or acuminate, the lower often short and crowded at the base of the stem, glabrous or pubescent, or sometimes sparingly pilose, margins scabrid, base narrow, rounded; sheaths terete or slightly compressed, shorter than the internodes; ligule $\frac{1}{10}$ in. long, membranous, truncate, ciliate. Racemes 3–8, digitately fasciculate, 1–2 in. long, slender, silky, suberect, flexuous, on short usually glabrous peduncles which are often bearded in the axils; rhachis very slender; joints and pedicels $\frac{1}{10}$ in. long, densely ciliate with long silky hairs, the central translucent band very narrow. *Sessile spikelets* $\frac{1}{6}$ in. long, oblong-lanceolate, acuminate by the projection of the point of the upper invol.-glume; callus bearded; lower invol.-glume elliptic-oblong, obtuse or truncate, sometimes slightly emarginate, with a deep pit above the middle (sometimes 2 pits when one is above, the other at or about the middle), subchartaceous, more or less hairy below the middle, 5–9-nerved, margins narrowly incurved,

spinulosely ciliate; upper invol.-glume lanceolate, acuminate, finely pointed at the tip, the point slightly projecting beyond the lower glume, 3-5-nerved, membranous, glabrous; lower floral glume $\frac{1}{10}$ in. long, linear-oblong, obtuse, nerveless, glabrous; upper floral glume reduced to a slender awn reaching nearly $\frac{3}{4}$ in. long, geniculate about the middle, the lower half brown, the upper yellowish-white, with a narrow linear hyaline flattened base $\frac{1}{12}$ in. long which represents the glume; palea 0. *Pedicellate spikelets* like the sessile but narrower, not awned; lower invol.-glume acute, very rarely pitted, 7–13-nerved, ciliate; upper invol.-glume ovate-lanceolate, acute, 5-nerved, with incurved margins; lower floral glume linear-oblong, obtuse, hyaline, glabrous. Fl. B. I. v. 7, p. 173; Trim. Fl. Ceyl. v. 5, p. 230; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1201; Watt, Dict. Econ. Prod. v. 1, p. 249.—Flowers: Sept. Lisboa (Journ. Bomb. Nat. v. 6 (1901) p. 202) says that the inflorescence of the grass is scented.

DECCAN: Poona, *Cooke*!; Lanoli, *Woodrow*; Sattara, *Lisboa*; Sholapur, *Lisboa*. KANARA: *Lisboa*.—DISTRIB. More or less throughout India in the drier parts; Ceylon, Tropical Asia, Africa and Australia, Sicily.

7. **Andropogon Kuntzeanus,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 478. A tall grass 3–5 ft. high; stems ascending, as thick as a goose-quill below, with 2–3 slender flowering branches above, terete, small; nodes densely bearded. Leaves narrowly linear, 12 by $\frac{1}{8}$–$\frac{1}{3}$ in., glabrous, glaucous, smooth, with scaberulous margins, the upper cauline leaves short, rigid. Racemes 12–15, corymbosely fasciculate, slender, silky, purplish; proper peduncles $\frac{1}{4}$–$\frac{1}{3}$ in. long, slender, glabrous; joints and pedicels $\frac{1}{10}$ in. long, with a translucent centre, slender, densely ciliate with very long erect hairs. *Sessile spikelets* $\frac{1}{5}$ in. long, linear-lanceolate; callus sparsely bearded at the base with very long hairs; lower invol.-glume ovate-lanceolate, thin, glabrous, usually pitted, 7–9-nerved, 2-toothed at the apex, the teeth about $\frac{1}{20}$ in. long; upper invol.-glume as long as the lower, lanceolate, acuminate, mucronate, ciliate; lower floral glume $\frac{1}{6}$ in. long, linear-lanceolate, glabrous, hyaline; awn $\frac{5}{8}$ in. long, the basal slightly flattened portion $\frac{1}{10}$ in. long. *Pedicellate spikelets* narrower than the sessile, male; lower invol.-glume 9–11-nerved, tip entire; upper invol.-glume 5-nerved, conspicuously ciliate; lower floral glume linear-oblong, hyaline, ciliate; upper floral glume small, narrowly linear or 0. Fl. B. I. v. 7, p. 175; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Oct.

KONKAN: *Stocks*! DECCAN: *Woodrow*, 153!; Máwal, *Woodrow*.—DISTRIB. India (Central Provinces, W. Peninsula).

8. **Andropogon ensiformis,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 175. Stems 2 ft. and upwards, densely tufted, stout, compressed, clothed with equitant leaf-sheaths; nodes glabrous. Leaves 8–10 by $\frac{1}{3}$–$\frac{1}{2}$ in., erect, strict, rigid, linear-lanceolate, acuminate, strongly nerved, glabrous or sparsely hairy, tips acicular, margins and both surfaces scaberulous; sheaths smooth, compressed, the lower equitant; ligule short, scarious. Racemes $\frac{1}{2}$–$\frac{2}{3}$ in. long, in an erect narrow thyrsus 3 in. long, pale purplish; proper peduncles $\frac{1}{6}$–$\frac{1}{4}$ in. long; joints and pedicels $\frac{1}{10}$ in. long, very slender, flat, with a translucent channel, ciliate with long

erect hairs. *Sessile spikelets* $\frac{1}{6}$ in. long, oblong-lanceolate, acute; callus small, densely bearded with hairs nearly $\frac{1}{2}$ as long as the spikelet; lower invol.-glume $\frac{1}{6}$ in. long, ovate-oblong, flat, truncate, often emarginate, shining, 5–7-nerved, not pitted, very sparsely silky-hairy below the middle, margins very narrowly incurved, keels slender; upper invol.-glume reaching $\frac{1}{5}$ in. long, ovate-oblong, acute, finely mucronate, slightly exceeding the lower, 3-nerved; lower floral glume less than $\frac{1}{6}$ in. long, linear-oblong, acute, hyaline; upper floral glume reduced to an awn reaching $\frac{7}{8}$ in. long, the flattened slightly dilated base $\frac{1}{16}$ in. long representing the glume. *Pedicellate spikelets* as long as the sessile, oblong-lanceolate; lower invol.-glume many-nerved; upper invol.-glume 5-nerved; lower floral glume as long as the sessile; upper floral glume 0. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Sept.

Dalzell without locality in Herb. Kew.! DECCAN: Lanoli, *Woodrow*.—DISTRIB. India (W. Peninsula), apparently endemic.

9. **Andropogon concanensis,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 174. Perennial; stems many from a nodose rootstock, 20–24 in. high, firm, smooth, terete, leafy; nodes glabrous. Leaves 8–10 by $\frac{1}{12}$–$\frac{1}{8}$ in., linear, finely acuminate, smooth on both surfaces; sheaths smooth, terete; ligule short, membranous, truncate, glabrous. Racemes 5–8, loosely fasciculate, 2–2$\frac{3}{4}$ in. long, slender, flexuous, pale; rhachis and proper peduncles filiform, glabrous, the latter $\frac{1}{2}$–$\frac{3}{4}$ in. long, with slightly bearded axils; joints and pedicels $\frac{1}{12}$ in. long, compressed, hardly grooved and not translucent in the centre, the sides not thickened, ciliate with long silky hairs. *Sessile spikelets* less than $\frac{1}{6}$ in. long, ovate-lanceolate, narrowly truncate; callus bearded; lower invol.-glume membranous, with incurved margins, glabrous, not pitted on the back, keels ciliate with short bristles, 7–9-nerved; upper invol.-glume as long as the lower, lanceolate, acuminate, ending in a fine point which just appears above the tip of the lower glume, faintly 3-nerved; lower floral glume much shorter than the others, oblong, obtuse, nerveless; upper floral glume a capillary yellowish awn reaching $\frac{3}{4}$ in. long with a slightly dilated base $\frac{1}{10}$ in. long. *Pedicellate spikelets* narrower than the sessile; lower invol.-glume 9-nerved; upper invol.- and lower floral glume as in the sessile spikelets; upper floral glume small, oblong, often unequally 2-fid, ciliate, nerveless. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Oct.

KONKAN: Matheran, *Woodrow*!

10. **Andropogon intermedius,** *Br. Prodr.* (1810) p. 202. Perennial; stem 2–4 ft. high or more, stout, erect or geniculately ascending, slightly flattened on one side, simple or sparingly branched, leafy upwards; nodes usually hairy. Leaves 6–18 by $\frac{1}{8}$–$\frac{1}{3}$ in., narrowly linear, glaucous, finely acuminate with capillary tip, subcoriaceous, glabrous or ciliate towards the base; sheaths terete, glabrous; ligule a narrow truncate membrane $\frac{1}{30}$ in. long, ciliate or not. Panicle 3–6 in. long, erect, pyramidal, thyrsiform or subcorymbose; rhachis glabrous; branches $\frac{1}{2}$–1$\frac{1}{2}$ in. long; racemes slender, fragile, pale-green or purplish, with a capillary rhachis; joints of the rhachis shorter than the spikelets with a translucent centre, ciliate. *Sessile spikelets* $\frac{1}{8}$–$\frac{1}{6}$ in.

long; callus very short, bearded; lower invol.-glume thin, oblong, obtuse or truncate, 4–9-nerved, margins narrowly incurved, rigidly ciliate above the middle, not pitted; upper invol.-glume as long as the lower, oblong-lanceolate, acute, faintly 3-nerved, smooth; lower floral glume much shorter, oblong, obtuse, nerveless; upper floral glume represented by the hyaline slightly flattened base of the awn; palea 0; awn reaching $\frac{5}{8}$ in. long. *Pedicellate spikelets* linear-oblong or lanceolate, narrower than the sessile; pedicel $\frac{1}{10}$ in. long with a translucent centre, usually ciliate. Fl. B. I. v. 7, p. 175; Trim. Fl. Ceyl. v. 5, p. 230; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1201.—Flowers: Dec.

DECCAN: Poona, *Woodrow*; Máwal, *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, China, Malaya, Pacific Islands, Africa.

11. **Andropogon odoratus,** *Dna. Lisboa, in Journ. Bomb. Nat.* v. 4 (1889) p. 123. Aromatic; stem erect, 3–4 ft. high, as thick as a swan's quill at the base, sometimes branching below, leafy; nodes bearded. Leaves 12–24 by $\frac{1}{6}$–$\frac{3}{8}$ in., linear-lanceolate, flat, acuminate, scaberulous on both surfaces and on the margins, bright green, with strong nerves; sheaths long, glabrous, smooth, compressed, the upper sheathing the base of the inflorescence; ligule small, membranous, truncate. Racemes numerous, purplish, silky, suberect, slender, flexuous, densely fascicled, pedicellate, crowded at the end of a long peduncle and forming a dense panicle 2–4 in. long; joints and pedicels flattened, with a translucent centre, silky-hairy, the joints $\frac{1}{16}$ in. long, the pedicels rather longer. *Sessile spikelets* purplish, $\frac{1}{6}$ in. long, oblong-lanceolate, acute; callus small, bearded with silky hairs; lower invol.-glume thin, oblong-lanceolate, truncate, 7-nerved, softly hairy below the middle, rarely pitted; upper invol.-glume very little longer than the lower and broader, thinly membranous, keeled; lower floral glume hyaline, oblong-lanceolate, shorter than the upper invol.-glume, nerveless; awn $\frac{1}{2}$–$\frac{5}{8}$ in. long, slightly dilated towards the base. *Pedicellate spikelets* as long as or slightly longer than the sessile; lower invol.-glume narrow, many-nerved, dorsally glabrous; upper invol.-glume 3-nerved, ciliate; lower floral glume shorter, oblong, obtuse, nerveless. The compressed sheaths, panicled racemes, villous lower invol.-glume of the sessile spikelets, and aroma seem to distinguish this from *Andropogon Kuntzeanus*, which it strongly resembles in a dry state (*Hooker*). Fl. B. I. v. 7, p. 177; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Oct. VERN. *Gavat-vedi.*

KONKAN: Khardi (Thána districts), *Mrs. Lisboa.* DECCAN: Lanoli, *Mrs. Lisboa*; Máwal (Poona districts), *Woodrow*; Khandesh, *Lisboa*.—DISTRIB. India (W. Peninsula), apparently endemic.

12. **Andropogon assimilis,** *Steud. in Zoll. Syst. Verz.* (1854) p. 58; *Syn. Gram.* (1855) p. 397. Suffruticose, fastigiately branched from a decumbent base; stems 1–2 ft. long, hard, smooth and polished, as thick as a goose-quill at the base, often proliferously branched; nodes glabrous or rarely bearded. Leaves 3–8 by $\frac{1}{10}$–$\frac{1}{4}$ in., linear-lanceolate, finely acuminate, glabrous or nearly so, with a strong white midnerve; sheaths usually glabrous, except at the mouth which is sometimes bearded, the upper sheaths appressed, the lower open, often divaricate;

ligule short, membranous, ciliate. Inflorescence in lax panicles; branches slender, almost capillary, with long hairs in the axils. Spikelets few, rather distant, pale-green; joints $\frac{1}{16}$ in. long, with a translucent centre, sparsely ciliate. *Sessile spikelets* $\frac{1}{10}$ in. long, ovoid-oblong; callus small, shortly bearded; lower invol.-glume $\frac{1}{10}$ in. long, ovate-oblong, shortly truncate, obscurely 4–6-nerved, ciliate chiefly in the upper half, not pitted; upper invol.-glume as long as the lower, lanceolate, acute; lower floral glume shorter, linear, obtuse; upper floral glume reduced to the scarcely flattened base of the awn; awn $\frac{3}{8}$–$\frac{1}{2}$ in. long, the lower half brown, the upper yellowish-white. *Pedicellate spikelets* $\frac{1}{6}$ in. long, not awned; pedicels $\frac{1}{16}$ in. long, sparsely ciliate; lower invol.-glume lanceolate, acute, the margins incurved and the keels ciliate in the upper part, 5–7-nerved; upper invol.-glume slightly shorter, lanceolate, 3-nerved; lower floral glume obovate-oblong, ciliate at the apex, hyaline; upper floral glume 0. Anthers $\frac{1}{16}$ in. long. Fl. B. I. v. 7, p. 179; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1201. *Andropogon montanus*, Benth. Fl. Hongk. (1861) p. 423 (*not* of Roxb.); Hack. Monog. Androp. in DC. Monog. Phan. v. 6 (1889) p. 490; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Dec.

DECCAN: Suvasni Ghát, *Woodrow*, 29! S. M. COUNTRY: Belgaum, *Ritchie*!—DISTRIB. India (Temperate Himalaya, Khasia, Behar, N. Bengal, W. Peninsula); Java, China, Japan.

13. **Andropogon Hugelii,** *Hack. Monog. Androp. in DC. Monog. Phan.* v. 6 (1889) p. 492. Stem often suffrutescent below, frequently red, branching from the base, the branches 2½–3½ ft. long; nodes bearded. Leaves 4–8 by $\frac{3}{8}$–$\frac{1}{2}$ in., linear-lanceolate, acuminate, flat, flaccid, green, narrowed to the base, the margins scaberulous or sometimes ciliate; sheaths bearded at the mouth, otherwise glabrous; ligule membranous, ciliate. Panicle 2-3½ in. long; branches capillary with bearded axils; joints and pedicels ciliate. *Sessile spikelets* $\frac{1}{8}$ in. long, pale-green or purplish; callus densely villous; lower invol.-glume chartaceous, ovate, truncate, villous below the middle or glabrous, margins narrowly incurved, the keels ciliate with long hairs; upper invol.-glume as long as the lower, glabrous, narrowly truncate, shortly apiculate; lower floral glume $\frac{1}{16}$ in. long, hyaline, ovate, obtuse, glabrous; upper floral glume represented by the slender white not dilated base of the awn; awn reaching nearly 1 in. long. *Pedicellate spikelets* $\frac{1}{6}$ in. long, lanceolate, green or purple; lower invol.-glume subacute, 9–11-nerved, pubescent up the back and with ciliate keels; upper invol.-glume as long as the lower, acuminate, the keels minutely ciliate; lower floral glume oblong, obtuse, hyaline, nearly as long as the upper invol.-glume, nerveless; upper floral glume narrowly linear or 0. Fl. B. I. v. 7, p. 180; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Sept.

DECCAN: Poona, *Woodrow*. S. M. COUNTRY: Belgaum, *Woodrow*.—DISTRIB. India (Central Provinces, Central India, W. Peninsula).

14. **Andropogon filiculmis,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 181. Stems 2–3 ft. long, decumbent and interlaced, copiously geniculately branched, weak, filiform, quite glabrous; internodes long; nodes

bearded. Leaves 2–4 by $\frac{1}{8}$–$\frac{1}{6}$ in., linear-lanceolate, finely acuminate with a filiform tip, glabrous above, glabrous or sparsely hairy beneath, flaccid, suddenly narrowed at the base, pale green, the midrib and nerves slender; sheaths bearded at the very tip, otherwise glabrous, the lower sheaths open below; ligule membranous, ciliate. Panicles 1–2 in. long.; branches few, filiform. Spikelets 2 or 3, pale-green or white; pedicels of upper spikelets ciliate with long hairs. *Sessile spikelets* $\frac{1}{5}$ in. long, oblong-lanceolate; callus densely villous; lower invol.-glume oblong-lanceolate, obtuse, membranous, 5–7-nerved, villous below the middle or all over, the keels ciliate; upper invol.-glume thinly membranous, lanceolate, acute, shortly mucronate, 3-nerved, glabrous; lower floral glume small, ovate, obtuse, nerveless, hyaline; upper floral glume represented by an awn $\frac{1}{2}$–$\frac{5}{8}$ in. long, the lower half dark brown, the upper half yellowish-white, the base not dilated, white for about $\frac{1}{12}$ in. *Pedicellate spikelets* as long as the sessile but narrower; lower invol.-glume ovate-lanceolate, acute, 7–9-nerved, ciliate; upper invol.-glume lanceolate, strongly 5-nerved; lower floral glume broadly oblong, obtuse, hyaline, nerveless, as long as the invol.-glumes; upper floral glume 0. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Nov.–Dec.

Deccan: Poona, *Jacquemont*, 310!; Dhonshi (Máwal districts), *Woodrow*, 26! and 116! Kanara: Sirsi, *Woodrow*.—Distrib. India (W. Peninsula), apparently endemic.

15. **Andropogon halepensis,** *Brot. Fl. Lusit.* v. 1 (1804) p. 89. Perennial; stems erect, tall, up to 15 ft. high, stout, simple or sparingly branched, glabrous, leafy; nodes minutely silky. Leaves 1–2 ft. by $\frac{3}{4}$–2 in., linear-lanceolate, tapering to a fine point, glabrous, smooth, margins scabridly serrulate, midrib stout, base narrowed or sometimes rounded; sheaths glabrous, striate; ligule short, membranous, ciliate. Panicle 6–18 in. long, decompound; rhachis nearly smooth; branches mostly alternate, suberect, filiform, the lower branches up to 8 in. long or more, the axils often bearded; racemes $\frac{1}{2}$–1 in. long, oblong; joints 3–7, more than $\frac{1}{2}$ as long as the sessile spikelets, more or less ciliate; pedicels similar. *Sessile spikelets* $\frac{1}{6}$–$\frac{1}{5}$ in. long, ovoid-lanceolate, dorsally compressed, green or purplish; callus small, shortly bearded. Glumes 4; lower invol.-glume subchartaceous, ovate, acute, convex, more or less silky-hairy, 5–13-nerved, with involute margins; upper invol.-glume as long as the lower, lanceolate, acuminate, chartaceous, shining, 5–7-nerved; lower floral glume almost as long as the upper invol.-glume, elliptic-oblong, obtuse, hyaline, ciliate; upper floral glume $\frac{1}{12}$ in. long, oblong, 2-lobed, hyaline, ciliate; awn $\frac{1}{2}$ in. long, sometimes reduced to a bristle or suppressed. *Pedicellate spikelets* about as long as the sessile but much narrower, not awned, male or barren; lower invol.-glume herbaceous, 5–9-nerved, glabrous, the keels ciliate; upper invol.-glume similar, 3–5-nerved; lower floral glume as in the sessile spikelets; upper floral glume linear-oblong, hyaline. Fl. B. I. v. 7, p. 182; Trim. Fl. Ceyl. v. 5, p. 231; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1201. *Sorghum halepense*, Pers. Syn. v. 1 (1805) p. 101; Watt, Dict. Econ. Prod. v. 6, part 3, p. 280.—Flowers: Dec. Vern. *Boru.*

Konkan: *Woodrow*; Bassein, *Lisboa*. Deccan: *Lisboa*; Poona, *Woodrow*; Dangs, *Woodrow*. Gujarat: *Lisboa*.—Distrib. Throughout India; Ceylon, most warm countries.

16. **Andropogon purpureo-sericeus,** *Hochst. ex A. Rich. Tent. Fl. Abyss.* v. 2 (1851) p. 469. Annual, robust; stem 3–4 ft. high, erect, stout or slender, smooth and polished, glabrous; nodes villous. Leaves 8–10 by $\frac{1}{4}$–$\frac{1}{3}$ in., linear, finely acuminate, sparingly appressedly hairy on both sides, the margins scabrous; sheaths subcompressed, glabrous except the villous mouth; ligule very short, ciliate. Panicle 4–8 in. long, erect; rhachis glabrous; branches filiform, subflexuous, $\frac{1}{2}$–1 in. long, often bulbously swollen at their articulation with the rhachis; racemes 1–1$\frac{1}{2}$ in. long, rarely of 3 joints, sometimes of 1 sessile and 2 pedicellate spikelets; joints about $\frac{1}{2}$ as long as the sessile spikelets. *Sessile spikelets* reaching $\frac{1}{4}$ in. long, densely villous with red or white hairs; callus small, densely villous. Glumes 4; lower invol.-glume ovate, acuminate, concave, coriaceous or cartilaginous, 7-nerved, with the margins involute from the base to the tip, clothed with long red or white hairs; upper invol.-glume as long as or rather longer than the lower, oblong-lanceolate, coriaceous, concave, acuminate or aristulate, 5-nerved, the back clothed in the upper part with long hairs, the margins narrowly infolded; lower floral glume as long, membranous, densely ciliate, oblong-lanceolate, glabrous on the back; upper floral glume very fragile, $\frac{1}{10}$ in. long, hyaline, 2-lobed, ciliate; awn reaching 1$\frac{1}{2}$ in. long, the column dark brown, twisted, and ciliate with short erect hairs. *Pedicellate spikelets* equalling the sessile but paler and narrower; lower invol.-glume linear-lanceolate, acute, 5–9-nerved, shortly silky; upper invol.- and lower floral glumes as in the sessile spikelets; upper floral glume a little shorter, lanceolate, acuminate, hyaline, ciliate. Fl. B. I. v. 7, p. 185; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Nov.

Deccan: *Woodrow*, 129!; *Lisboa*; Kolhapur, *Woodrow*. S. M. Country: Belgaum, *Ritchie*, 887! Kanara: N. Kanara, *Woodrow*, 40!—Distrib. India (Central Provinces, W. Peninsula); Abyssinia.

17. **Andropogon aciculatus,** *Retz. Obs.* fasc. 5 (1789) p. 22. Rootstock woody, creeping; stems erect or ascending, 1–2 ft. long, slender, leafy chiefly at the base; lower internodes very short, the upper elongate; nodes glabrous. Leaves densely tufted, 1–5 by $\frac{1}{3}$–$\frac{1}{5}$ in., linear, obtuse or subacute, flat or with undulate margins, glaucous, usually glabrous, the margins more or less distantly spinulose; sheaths not auricled, the lower short, the upper elongate with a more or less hairy mouth; ligule a very short membrane. Panicles 1–3 in long, narrowly oblong, pale green or purplish; rhachis strict, filiform; branches short, spreading, at length erect, capillary, bearing few spikelets. *Sessile spiketets* $\frac{1}{8}$ in. long, dorsally compressed; callus elongate, decurrent on the peduncle and with it laterally fulvously bearded. Glumes 4; lower invol.-glume chartaceous, narrowed from a broad base to the usually bimucronulate tip, dorsally convex, glabrous on the back, the keels ciliate with short stiff erect hairs, obscurely 2–3-nerved; upper invol.-glume as long, lanceolate, acuminate or aristulate, 1-nerved, the keel setosely ciliate; lower floral glume shorter, linear-oblong, obtuse, 2-nerved; upper floral glume narrow, hyaline, ciliate; awn terminal, about $\frac{1}{5}$ in. long, not twisted. *Pedicellate spikelets* reaching $\frac{1}{5}$ in. long, lanceolate, cuspidately acuminate, purplish; pedicels nearly as long as the sessile spikelets, flattened, glabrous except for a small tuft of hairs at the base; lower

invol.-glume thin, lanceolate, acuminate, 3-nerved; upper invol.-glume a little shorter, acuminate, 3-nerved, ciliate; lower floral glume hyaline, oblong, acuminate, shorter than the invol.-glumes, nerveless; upper floral glume smaller, broader, 3-nerved, ciliate. Anthers $\frac{1}{18}$ in. long. Fl. B. I. v. 7, p. 188; Grah. Cat. p. 238; Dalz. & Gibs. p. 303; Trim. Fl. Ceyl. v. 5, p. 234; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1202; Watt, Dict. Econ. Prod. v. 1, p. 242.—Flowers: Oct.

KANARA: Karwar, *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, Australia, Polynesia, Tropical Asia.

18. **Andropogon lancearius,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 190. Stem 2–3 ft. high or more, leafy upwards; nodes glabrous. Leaves 12–14 by $\frac{1}{3}$–$\frac{1}{2}$ in., lanceolate, acuminate, narrowed from below the middle to the base, smooth on both surfaces, flat, midrib broad, white above, margins minutely spinulose; sheaths keeled, quite glabrous; ligule a row of fine short hairs. Panicle 6 in. long, narrow, of many whorls of simple smooth erect branches bearing solitary erect racemes. *Sessile spikelets* $\frac{1}{4}$ in. long; callus about $\frac{1}{16}$ in. long, glabrous in front. Glumes 4; lower invol.-glume nearly $\frac{1}{4}$ in. long, oblong, chartaceous, truncate or notched, obscurely 5-nerved; upper invol.-glume $\frac{1}{5}$ in. long, oblong, chartaceous, shortly ciliate on the keels, otherwise glabrous, cleft at the apex into 2 acute lobes; lower floral glume $\frac{1}{6}$ in. long, linear-oblong, obtuse, hyaline; upper floral glume $\frac{1}{10}$ in. long, linear, hyaline; awn $1\frac{5}{8}$ in. long, the column much twisted and densely hairy with reddish-brown hairs. *Pedicellate spikelets* nearly $\frac{1}{3}$ in. long (not including the awn), lanceolate, acute, awned; pedicels nearly white, $\frac{1}{6}$ in. long, flattened, ciliate with long reddish-brown hairs. Lower invol.-glume lanceolate, acute, 2-toothed at the tip, with an awn about $\frac{1}{10}$ in. long between the acicular teeth, 7-nerved, membranous, glabrous; upper invol.-glume as long as the lower, lanceolate, acuminate, membranous, 5-nerved; lower floral glume shorter, linear-oblong, obtuse, ciliate, hyaline; upper floral glume hyaline. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1202.—Flowers: Oct.

S. M. COUNTRY; Castlerock, *Woodrow*.—DISTRIB. India (Sikkim Himalaya, Behar, Chota Nagpur, W. Peninsula).

This is included on the authority of Woodrow. I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew.

19. **Andropogon Monticola,** *Schult. Mant.* (1824) p. 665. Perennial; stems densely tufted, 1–4 ft. high, usually slender, erect, simple or branched, leafy chiefly at the base; nodes glabrous. Leaves 2–18 by $\frac{1}{8}$–$\frac{1}{4}$ in., erect, linear, acute, flat, rigid, glaucous, smooth or scaberulous; sheaths, the upper terete, the lower compressed; ligule a very short ciliate membrane. Panicle 2–5 in. long, ovate or oblong; rhachis slender, smooth or scaberulous; branches 1–2 in. long, whorled, capillary, spreading, at length erect; racemes reduced to a single sessile female and 2 pedicellate spikelets. *Sessile spikelets* $\frac{1}{4}$ in. long; callus about $\frac{1}{30}$ in. long, bearded on one side with rufous hairs. Glumes 4; lower invol.-glume $\frac{1}{5}$ in. long, linear, complicate, 2-toothed at the apex, chartaceous, 4-nerved, more or less scaberulous; upper invol.-glume $\frac{1}{4}$ in. long, ovate-lanceolate, concave, much broader than the lower, ciliate on

the keel with rufous hairs, very shortly toothed at the apex, with an awn ½ in. long and with broadly hyaline margins, 3-nerved; lower *floral glume oblong, obtuse, ciliate*; upper floral glume narrowly linear, hyaline; awn ¾ in. long. *Pedicellate spikelets* as long as the sessile; pedicels $\frac{1}{12}$ in. long, ciliate with rufous hairs, flattened; lower invol.-glume lanceolate, acute or awned, 7-nerved, scaberulous; upper invol.-glume lanceolate, acuminate, or very shortly awned; floral glumes smaller, oblong, hyaline, ciliate. Fl. B. I. v. 7, p. 192; Trim. Fl. Ceyl. v. 5, p. 236; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1202.—Flowers: Oct. VERN. *Ayiva.*

Throughout the Presidency, *Lisboa.* DECCAN: Poona, *Woodrow*; Khandala, *Woodrow*; Kolhapur, *Woodrow.*—DISTRIB. More or less throughout India; Ceylon, Afghanistan, S. Africa.

I have not seen any specimens from the Bombay Presidency and am therefore unable to fix definitely the variety to which the Bombay species belong. They will probably belong to VAR. *Trinii*, H. f.

20. **Andropogon Aucheri,** *Boiss. Diag.* ser. 1, fasc. 5 (1844) p. 77. Densely tufted; stems 6–18 in. long, simple or sparingly branched, base thickened; nodes glabrous. Leaves 2–4 by $\frac{1}{16}$–$\frac{1}{6}$ in., linear, acute or acuminate, more or less pubescent, sometimes undulate, pale green, often ciliate near the base with bulbous-based hairs; sheaths usually glabrous, very pale, with a few hairs at the mouth; ligule a hairy ridge. Panicle 2–3 in. long; branches in whorls of 4–6, spreading, then suberect; racemes usually crowded, rarely 2-nate on a branch. *Sessile spikelets* ¼ in. long; callus $\frac{1}{16}$ in. long, villous all over with long silky hairs; lower invol.-glume ⅕ in. long, linear, with 2 short acicular teeth at the apex, minutely ciliate on the margins, obscurely 5-nerved, chartaceous; upper invol.-glume as long as the lower, oblong, obtuse, 1-nerved, chartaceous, with hyaline margins, the keel ciliate above the middle with long silky hairs, and with a slender awn ⅓ in. long, the awn ciliate below the middle with long hairs; lower floral glume linear, obtuse, hyaline; upper floral glume represented by the dilated base of the awn; awn ⅞ in. long, base hyaline, dilated. *Pedicellate spikelets* slightly longer than the sessile, linear-lanceolate, acute; pedicels cuneate, silky-villous from base to apex, less than ½ as long as the sessile spikelets; lower invol.-glume lanceolate, acute, ¼ in. long, 7-nerved; upper invol.-glume lanceolate, acuminate, 3-nerved; lower floral glume shorter, hyaline, oblong, acute; upper floral glume lanceolate, acute, 1-nerved, hyaline. Anthers ⅛ in. long. Fl. B. I. v. 7, p. 195; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.

SIND: Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. Afghanistan, N. Africa.

21. **Andropogon Cookei,** *Stapf, ex Woodr. in Journ. Bomb. Nat.* v. 13 (1901) p. 438. A weak straggling much-branched annual; stems reaching 2 ft. long, very slender, smooth, quite glabrous; nodes glabrous. Leaves 3–6 by ⅛–¼ in., flaccid, finely pointed, sparsely clothed with bulbous-based hairs on both sides, scaberulous; sheaths glabrous; ligule hyaline, ovate, ciliolate. Racemes ½–¾ in. long, solitary on the apices of the stems and branches; joints between the 2 or 3 lowest nodes continuous, short, cylindric, glabrous, the others about $\frac{1}{15}$ in. long, distarticulating, subclavate, densely ciliate on one

side with long silky hairs which equal or exceed the pedicels; lowest pedicels very short, glabrous, the others $\frac{1}{12}$ in. long, ciliate on one side with long silky hairs, dilated into an oblique sac-like mouth above, and produced into a projecting flat horn. Spikelets closely imbricate, straw-colored, scarious. *Sessile spikelets* 2-sexual (except the lowest which is very often neuter); lower invol.-glume $\frac{1}{3}$ in. long, oblong or elliptic-oblong, acute, or shortly bifid, or sublacerate at the apex, the margins narrowly infolded, rigid, the keels deeply winged with subequal scarious wings about $\frac{1}{20}$ in. deep and more or less toothed on the margins, 7-9-nerved between the keels, the keel-nerves running into the points of the wings; upper invol.-glume shorter than the lower, oblong-lanceolate, obtuse, apiculate, 3-nerved, chartaceous, margins narrowly incurved, keels glabrous; lower floral glume $\frac{1}{6}$ in. long, oblong, obtuse, hyaline, nerveless, glabrous; upper floral glume reduced to the white flattened lanceolate base of the awn; awn $\frac{3}{4}$ in. long, the column much twisted. *Pedicellate spikelets* longer than the sessile, obliquely lanceolate; lower invol.-glume nearly $\frac{1}{2}$ in. long, acute, unequally winged, many-nerved; upper invol.-glume $\frac{1}{6}$ by $\frac{1}{12}$ in., lanceolate, acute, 5-nerved, chartaceous; lower floral glume $\frac{1}{8}$ in. long, oblong, obtuse, hyaline; upper floral glume $\frac{1}{10}$ in. long, oblong, obtuse, hyaline. Anthers $\frac{1}{16}$ in. long. Grain $\frac{1}{6}$ in. long, oblong, compressed. The plant does not agree with Hackel's subgenus *Dichanthium* very satisfactorily, but it is the only subgenus into which it will fit at all.

DECCAN: Sakar-pathár hill near Lanoli, *Woodrow*!

22. **Andropogon armatus,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 197. Annual, erect; stems 12–18 in. long, tufted, slender, simple or branched above, glabrous and shining; nodes bearded. Leaves 4–6 by $\frac{1}{6}$–$\frac{1}{4}$ in., linear, copiously hairy on both surfaces and with long bulbous-based hairs at the base; sheaths lax, glabrous except on the upper margins where they are more or less ciliate, the upper sheaths pale spathiform; ligule 0. Racemes $\frac{1}{2}$–$1\frac{1}{2}$ in. long, subdigitate, 2–5, flexuous; lowest pair of spikelets male; peduncles $\frac{1}{6}$–$\frac{1}{3}$ in. long, capillary, with whorls of long white hairs in their axils; joints and pedicels slender, not grooved, terete, ciliate with silky hairs. Spikelets 10–20 pairs. *Sessile spikelets* $\frac{1}{3}$ in. long; callus very short, bearded, with silky hairs; lower invol.-glume thin, pale, nerveless, silky below the middle, often with a deep dorsal pit, margins narrowly incurved, keels ciliate; upper invol.-glume ovate, acute, nerveless, subchartaceous, silky-villous on the back; lower floral glume oblong or linear, obtuse, flat, hyaline, nerveless; upper floral glume represented by a slender awn 1 in. long with an acute base. *Pedicellate spikelets* equalling the sessile but rather narrower; lower invol.-glume armed with spreading submarginal bulbous-based bristles often $\frac{1}{4}$ in. long or more, slightly convex, quite smooth between the bristles, many-nerved, keels ciliate; upper invol.-glume lanceolate, acute, 3-nerved, ciliate; lower floral glume oblong, obtuse, eciliate; upper floral glume very narrow. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.

KONKAN: *Stocks*!—DISTRIB. India (W. Peninsula).

23. **Andropogon caricosus,** *Linn. Sp. Pl.* ed. 2 (1763) p. 1480. Stems erect or ascending from a creeping base, forming tufts at the

rooting nodes, 1–2 ft. high, stout or slender, grooved on one side, leafy; nodes usually glabrous, less frequently bearded. Leaves 6–8 by $\frac{1}{10}$–$\frac{1}{6}$ in., linear, finely acuminate, flat, glabrous, sometimes ciliate at the base, the margins scaberulous; sheaths glabrous, compressed, the mouth not auricled; ligule a narrow shortly ciliate membrane. Racemes 1–4 in. long, solitary, 2-nate or subdigitately paniculate, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, pale green or silvery, the lower sometimes stipitate; joints and pedicels about $\frac{1}{3}$ as long as the sessile spikelets, ciliate on one margin. *Sessile spikelets* $\frac{1}{6}$ in. long; callus short, bearded; lower invol.-glume $\frac{1}{8}$ in. long, obovate, concave, ciliate at the rounded or truncate apex, 7–9-nerved, subchartaceous; upper invol.-glume longer than the lower, ovate-lanceolate, acute, often apiculate, subchartaceous, ciliate, 3-nerved; lower floral glume as long as the lower invol.-glume, ovate-oblong, subacute, hyaline, nerveless, ciliate; upper floral glume represented by the hyaline not dilated base of the awn; awn $\frac{7}{8}$ in. long, the hyaline base about $\frac{1}{8}$ in. long. *Pedicellate spikelets* nearly as long as the sessile; lower invol.-glume obovate, obtuse, with narrowly incurved margins and ciliate keels, many-nerved; upper invol.-glume as in the sessile spikelet; lower floral glume ovate-oblong, subacute, hyaline, ciliate; upper floral glume nearly as long as the lower, linear-oblong, obtuse, hyaline. Anthers $\frac{1}{10}$ in. long. Fl. B. I. v. 7, p. 196; Trim. Fl. Ceyl. v. 5, p. 237; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1202.—Flowers: Dec.

Dalzell, without locality in Herb. Kew. DECCAN: Máwal (Poona districts), *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*, 794!—DISTRIB. India (Bengal, Birma, Central Provinces, W. Peninsula); Ceylon, Mauritius, China.

24. **Andropogon annulatus,** *Forsk. Fl. Ægypt.-Arab.* (1775) p. 173. Perennial, densely tufted; stem erect or ascending, usually simple, 6–36 in. long; nodes usually bearded. Leaves 3–12 by $\frac{1}{5}$–$\frac{1}{4}$ in., linear, finely acuminate, glaucous, glabrous or more or less sparsely hairy above with small bulbous-based hairs, the margins scabrid; sheaths bearded at the tip; ligule nearly $\frac{1}{8}$ in. long, oblong, obtuse, membranous, glabrous. Racemes 1–2½ in. long, subdigitately fascicled, pinkish or nearly white; peduncles glabrous, $\frac{1}{6}$–$\frac{1}{2}$ in. long; joints and pedicels $\frac{1}{2}$ as long as the spikelets, sparingly ciliate. *Sessile spikelets* about $\frac{1}{6}$ in. long, but variable in length, elliptic-oblong, closely imbricating; callus thick, shortly bearded at the base; lower invol.-glume elliptic-oblong, obtuse, ciliolate at the rounded or truncate apex, thin, margins narrowly incurved, the keels ciliate, the back hairy or glabrous, 5–9-nerved, the nerves not reaching the tip; upper invol.-glume equalling the lower but narrower, lanceolate, subacute, glabrous or ciliolate, 3-nerved; lower floral glume as long as the upper invol.-glume, linear-oblong, obtuse, nerveless, glabrous; upper floral glume represented by the flattened white base of a scabrid slender awn $\frac{3}{4}$ in. long. *Pedicellate spikelets* about equalling the sessile, male or neuter; lower invol.-glume elliptic-oblong, obtuse, 7–11-nerved, the keels bristly; upper invol.-glume narrower, 3-nerved; lower floral glume ciliate; upper floral glume small or obsolete. Fl. B. I. v. 7, p. 196; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1202. *Andropogon scandens*, Roxb. Fl. Ind. v. 1 (1832) p. 258;

Grah. Cat. p. 238; Dalz. & Gibs. p. 301.—Flowers: Oct. VERN. *Márvel.*

KONKAN: *Lisboa*! DECCAN: *Dalzell & Gibson*; Poona, *Woodrow*, 122! SIND: *Stocks*, 646!—DISTRIB. Throughout India; Tropical Africa, China, Australia, Pacific Islands.

25. **Andropogon polystachyos,** *Roxb. Fl. Ind.* v. 1 (1832) p. 261. A dwarf erect grass 6–10 in. high; stems slender, leafy above, corymbosely branched. Leaves 2–4 by $\frac{1}{20}$–$\frac{1}{16}$ in., the lower flat, the upper convolute, erect, hairy on both sides with long slender hairs, the margins thickened; sheaths hairy; ligule a short ciliate membrane. Racemes solitary, $\frac{1}{2}$–1 in. long, on very slender peduncles 2–4 in. long, with a very slender sheath and a small leaf about the middle, the 5 or 6 lower pairs of spikelets neuter; joints $\frac{1}{12}$ in. long, terete. *Sessile female spikelets* dark brown, $\frac{1}{5}$ in. long; callus bearded on one side with brown hairs; lower invol.-glume oblong when opened out, obtuse, with membranous tip and infolded margins, 7–9-nerved, pubescent on the back; upper invol.-glume linear-oblong with a coriaceous centre and broad hyaline margins; lower floral glume shorter, oblong, ciliate; upper floral glume represented by the acute base of the awn; awn $1\frac{1}{2}$–2 in. long, hairy. *Pedicellate spikelets* $\frac{1}{4}$ in. long; pedicels $\frac{1}{20}$ in. long, glabrous; lower invol.-glume with a coriaceous many-nerved centre and broad hyaline wings; upper invol.-glume lanceolate, ciliate, 5-nerved. *Neuter spikelets*: lower invol.-glume like the pedicellate but broader, 2-toothed at the tip. Fl. B. I. v. 7, p. 202; Dalz. & Gibs. p. 301; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Nov.

DECCAN: Khandala, *Woodrow*; Mahableshwar, western side of the hill, *Dalzell & Gibson*.—DISTRIB. Peninsula of India.

A rare grass; there is but 1 sheet altogether in Herb. Kew. from Wight's Herbarium.

26. **Andropogon triticeus,** *R. Br. Prod.* (1810) p. 201. Perennial; roots of very stout tortuous fibres; stem 4–8 ft. high, as thick as a swan's quill below, hard, smooth, polished, leafy, simple or branched below. Leaves 1–2 ft. by $\frac{1}{4}$–$\frac{3}{4}$ in., narrowly linear, acuminate, glaucous, sparsely hairy, margins scabrous; sheaths compressed, keeled, smooth; ligule a rounded scarcely ciliolate membrane. Racemes 3–6 in. long; rhachis inarticulate except the 4–6 upper nodes, glabrous; spikelets very many, all, except the few terminal, closely imbricating, subsecund, awnless, male or neuter with a short glabrous callus. *Upper sessile spikelets* long-awned, $\frac{1}{3}$ in. long; callus long, acute, densely bearded with dark brown hairs; lower invol.-glume linear-oblong, subterete, rigidly coriaceous, with an obtuse rounded membranous ciliolate tip, dorsally deeply grooved, the margins involute, not winged; upper invol.-glume slightly longer than the lower, linear, subterete, rigidly coriaceous, scaberulous, with pale sigmoidly incurved chartaceous margins, obtuse, with membranous truncate or minutely 3-toothed tip; lower floral glume short, oblong, truncate, hyaline, nerveless; upper floral glume represented by the flattened white base of the awn; awn very stout, hirsute, 2–3 in. long. *Upper pedicellate spikelets* reaching $\frac{3}{4}$ in. long, neuter; pedicels very short, subclavate, glabrous; lower invol.-glume more or less twisted,

lanceolate, acuminate, many-nerved; upper invol.-glume rather shorter than the lower, linear-lanceolate, acuminate, ciliate, chartaceous, 3-nerved; lower floral glume shorter than the invol.-glumes, lanceolate, acuminate, ciliate; upper floral glume narrowly oblanceolate, 1-nerved, ciliate near the apex. *Lower spikelets* $\frac{1}{2}$–$\frac{3}{4}$ in. long, neuter or male, like the pedicellate ones. Ft. B. I. v. 7, p. 200; Trim. Fl. Ceyl. v. 5, p. 239; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Dec.

KONKAN: *Stocks*! DECCAN: Máwal (Poona districts), *Woodrow*.—DISTRIB. India (Central Provinces, Birma, W. Peninsula); Ceylon, Malaya, Australia.

27. **Andropogon Ritchiei,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 201. Stems stout, erect, rigid, 4 ft. and more high. Leaves 18 by $\frac{3}{8}$ in., linear from a narrow base, bluntly acuminate, flat, rigid, shortly hairy on both sides with bulbous-based hairs, the margins spinulosely serrulate; sheaths glabrous; ligule $\frac{1}{4}$ in. long, membranous, divided almost to the base into numerous narrow acute segments. Racemes 1–2 in. long, green, hispid, the lower 1–2 pairs of spikelets homogamous. *Sessile spikelets* rather more than $\frac{1}{4}$ in. long; callus nearly $\frac{1}{10}$ in. long, densely bristly with brown hairs; lower invol.-glume broadly ovate when opened out, bluntly acuminate, truncate, hairy on the back, the margins narrowly incurved, keels bristly, not channelled, dorsally obscurely nerved; upper invol.-glume linear-oblong with rounded and shortly apiculate apex, 3-nerved, with a coriaceous hispid centre and membranous margins; lower floral glume $\frac{1}{6}$ in. long, narrowly linear, subacute, hyaline, nerveless; upper floral glume represented by the acute not dilated base of the awn; awn more than $1\frac{1}{2}$ in. long, tortuous, with a dark brown more or less pubescent column, the upper part very slender. *Pedicellate spikelets* $\frac{1}{2}$ in. long; pedicels short, glabrous; lower invol.-glume lanceolate, acute, the margins equally winged and infolded, the keels with a row of long tubercular-based golden-yellow bristles; upper invol.-glume as long, lanceolate, 3-nerved; lower floral glume $\frac{3}{8}$ in. long, narrowly oblanceolate, hyaline; upper floral glume shorter, narrowly linear, acute. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438.—Flowers: Oct.–Dec.

DECCAN: hills near Poona, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*!—DISTRIB. India (W. Peninsula).

28. **Andropogon contortus,** *Linn. Sp. Pl.* (1753) p. 1045. Perennial; stems 1–5 ft. long, densely tufted, erect or decumbent below, slender, leafy chiefly at the base, simple or subfastigiately branched, compressed towards the base. Leaves 6–12 by $\frac{1}{10}$–$\frac{1}{5}$ in., linear, often shortly and abruptly (rarely long)-acuminate, flat, suberect, rigid, often sparingly ciliate towards the base, sometimes with scattered bulbous-based hairs above, scaberulous below; sheaths compressed, keeled, glabrous, the mouth shortly auricled; ligule short, truncate, ciliolate. Racemes $1\frac{1}{2}$–3 in. long; internodes very short, the lower inarticulate; spikelets closely imbricating, subsecund, the lower 2–6 or more sessile, awnless, male or neuter, the upper sessile spikelets narrow, long-awned, female. *Sessile* (female) *spikelets* $\frac{1}{4}$ in. long; callus long, acute, pungent, bearded with reddish-brown hairs; lower invol.-glume linear-oblong, truncate, dark brown, many-

nerved, hispidulous, margins strongly incurved (not winged), tip membranous; upper invol.-glume linear, obtuse, concave, rigidly coriaceous, dark brown, hispidulous; lower floral glume short, oblong, truncate, nerveless; upper floral glume represented by the subulate white base of a hirsute awn which reaches 3 in. or more long. *Pedicellate spikelets* much longer than the sessile ($\frac{1}{3}$–$\frac{1}{2}$ in. long); pedicel very short; lower invol.-glume lanceolate, usually obliquely twisted, herbaceous, dorsally hispid with long bulbous-based hairs, the margins more or less (often unequally) winged, the wings serrulate; upper invol.-glume oblong-lanceolate, acuminate, 5-nerved, margins hyaline; lower floral glume oblong, 1-nerved; upper floral glume obovate-oblong, ciliate, nerveless. *Lower sessile spikelets* like the pedicellate, more or less covered with bulbous-based hairs. Fl. B. I. v. 7, p. 199; Grah. Cat. p. 238; Dalz. & Gibs. p. 300; Trim. Fl. Ceyl. v. 5, p. 238; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1202; Watt, Dict. Econ. Prod. v. 1, p. 244.—Flowers: Nov. VERN. *Kursali.*

Common throughout the Presidency. It is a very troublesome weed, the long awns twisting together like the strands of a rope and the sharp callus of the spikelets sticking into the hides of animals. It is a great annoyance to sportsmen, who come out of a patch of the grass with their lower garments covered with the awns. The grass is known to Anglo-Indians as *Spear Grass.*—DISTRIB. Tropics generally.

Andropogon Sorghum, Brot. Fl. Lusit. v. 1 (1804) p. 88. A tall handsome grass, usually very robust, with a decompound panicle, extensively cultivated throughout India for its grain. Whether originally a native of India is very doubtful; no Indian writer records having found it wild or naturalized. It is cultivated in the warmer parts of Europe, Asia and Africa, has been introduced into America and Australia, and is known as the *Great Millet.* Fl. B. I. v. 7, p. 183; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1201. *Sorghum vulgare*, Pers. Syn. v. 1 (1805) p. 101; Watt, Dict. Econ. Prod. v. 6, part 3, p. 289. *Holcus Sorghum*, Linn. Sp. Pl. (1753) p. 1047; Grah. Cat. p. 238; Dalz. & Gibs. Suppl. p. 99.—VERN. *Jondla*; *Juári.*

Andropogon squarrosus, Linn. f. Suppl. (1781) p. 433. The *Khas-Khas*; cultivated but not apparently indigenous in Bombay. The roots are made into mats which are known as *tattis* and hung over doors and kept wet to cool the atmosphere during the hot season. The aroma from the wetted roots is very agreeable. Fl. B. I. v. 7, p. 186; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1201. *Andropogon muricatus*, Retz. Obs. fasc. 3 (1783) p. 43; Grah. Cat. p. 238; Dalz. & Gibs. p. 302; Watt, Dict. Econ. Prod. v. 1, p. 245.

Andropogon Schœnanthus, Linn. Sp. Pl. (1753) p. 1046. The *Lemon-Grass*; cultivated extensively in the Bombay Presidency for the manufacture of *Lemon-Grass oil*, which is used as an external application in rheumatic affections. The oil is made largely in Khandesh and in the Panch Mahâls and sells at a high price. Fl. B. I. v. 7, p. 204; Grah. Cat. p. 238; Dalz. & Gibs. Suppl. p. 99; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 438; Prain, Beng. Pl. p. 1200; Watt, Dict. Econ. Prod. v. 1, p. 249.—VERN. *Surwai.*

32. **PSEUDANTHISTIRIA,** Hook. f.

Annual grasses. Leaves narrow. Panicle leafy; branches slender, filiform, each bearing a single raceme clothed by a proper spathe, the racemes subumbellate, the umbel subtended by a common spathe. Proper spathes lanceolate or linear-lanceolate, acuminate, keeled. Spikelets within each proper spathe usually consisting of 1 sessile 2-sexual spikelet with 1 pedicellate male and a secund sessile 2-sexual spikelet with 2 pedicellate males. *Sessile 2-sexual spikelets* with a short callus; lower invol.-glume chartaceous, truncate, with inflexed margins, 4–7-nerved, the nerves apparent only towards the apex; upper invol.-glume equalling the lower, linear-lanceolate, glabrous, 3-nerved, membranous; lower floral glume small, quadrate; upper floral glume represented by the hyaline base of a long capillary geniculate awn. Lodicules cuneate. *Pedicellate male spikelets* on slender pedicels: lower invol.-glume thin, about 9-nerved, margins narrowly incurved; upper invol.-glume 3-nerved; lower floral glume very small, oblong. Stamens 3; anthers linear. Styles short; stigmas short, exserted. Grain small.—DISTRIB. India; species 4.

1. **Pseudanthistiria hispida,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 219. Annual; stem 1–2 ft. high, rather stout, erect, glabrous and polished; nodes glabrous. Leaves 2–5 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear, finely acuminate, sometimes with a bristle-point, hairy on both surfaces with bulbous-based hairs, more or less subspinulosely ciliate on the margins, strongly nerved; sheaths hairy on the upper part with bulbous-based hairs, usually glabrous below; ligule a truncate glabrous membrane much divided to the base into narrow segments, the tips minutely ciliolate. Panicle elongate, simple; branches very slender, reaching 3 in. long, often in pairs; fascicles $\frac{3}{4}$ in. broad, copiously hirsute with bulbous-based hairs; outer spathes $1\frac{1}{2}$ in. long or more; proper spathes much longer than the racemes, all hirsute on the margins with strong bristles from tubercular bases. *Sessile spikelets* $\frac{1}{6}$ in. long; callus shortly bearded; lower invol.-glume $\frac{1}{6}$ in. long, oblong, truncate at the membranous ciliolate apex, with narrowly infolded margins and obscure nerves, glabrous; upper invol.-glume as long as the lower, oblong, obtuse, 3-nerved with hyaline margins; lower floral glume small, quadrate; upper floral glume represented by the very acute base of the awn; awn 1–$1\frac{1}{4}$ in. long. *Pedicellate spikelets* lanceolate, hairy; pedicels finely hairy. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Oct.–Nov. VERN. *Pokalya.*

Dalzell without locality in Herb. Kew.! KONKAN: *Stocks!*; Kalyan, *Woodrow.* DECCAN: Panchgani, *Woodrow.* S. M. COUNTRY: Londa, *Woodrow.*—DISTRIB. India (Central Provinces, W. Peninsula).

33. **THEMEDA,** Forsk. (1775).

ANTHISTIRIA, Linn. f. (1779).

Tall annual or perennial grasses. Leaves long, narrow. Spikelets heteromorphous, clustered on the articulate fragile rhachis of short solitary racemes subtended by proper spathes and crowded in paniculate fascicles; lowest 2 pairs of each raceme closely approximate, male or barren, awnless, sessile or subsessile, usually persistent, forming a

spurious tetramerous whorl enveloping the upper 1–3 pairs, each of which consists of a sessile hermaphrodite, and a pedicellate male spikelet, the latter much resembling those of the involucre. Florets 2, the lower reduced to an empty glume, the upper hermaphrodite in the sessile upper spikelets, male in the involucral and pedicellate spikelets or these more or less reduced or barren. *Bisexual spikelets*: invol.-glumes equal or subequal; lower usually coriaceous, at length hardened and often dark brown to almost black; upper obtusely keeled, coriaceous and channelled along the keel, with membranous margins; lower floral glume hyaline; upper very narrow, passing from a hyaline base into a usually stout awn, very rarely linear and awnless. Palea obsolete or 0. Lodicules 2, cuneate, glabrous. Stamens 3. Stigmas laterally or subterminally exserted. Grain linear-obovoid, biconvex, with 2 grooves on the anterior side. *Involucral and pedicellate spikelets*: invol.-glumes equal or subequal; lower herbaceous, dorsally flattened, 2-keeled, many-nerved; upper membranous, lanceolate, acute, 3-nerved, with ciliate margins; lower floral glume hyaline, 1-nerved or like the upper suppressed.—DISTRIB. Tropical and subtropical regions of the world; species about 10.

Involucral spikelets truly verticillate.
- Perennial ..... 1. *T. imberbis.*
- Annual ..... 2. *T. ciliata.*

Involucral spikelets in closely superposed pairs.
- Inflorescence a decompound thyrsiform panicle; lower invol.-glume of bisexual spikelets not channelled ..... 3. *T. cymbaria.*
- Inflorescence a racemiform panicle; lower invol.-glume of bisexual spikelets deeply channelled ..... 4. *T. tremula.*

1. **Themeda imberbis,** *T. Cooke.* Perennial, densely tufted; stem 1–3 ft. high, stout or slender, erect, or geniculate and ascending, subsimple or branched, glabrous, polished; nodes glabrous. Leaves 3–8 by $\frac{1}{10}$–$\frac{1}{5}$ in., narrowly linear, finely acuminate, coriaceous, flat, rather rigid, margins scabrid; sheaths compressed, keeled, smooth; ligule a narrow ciliolate membrane. Panicle narrow, racemiform, 3–8 in. long, sparingly branched; branches solitary or the upper 2–3-nate, filiform, bearing capituliform usually dense distant fascicles of racemes; spathes lanceolate, obtusely acuminate, about 1 in. long, usually bearded at the base, glabrous or sparsely hairy, greenish or tinged with red; racemes $\frac{1}{2}$–$\frac{3}{4}$ in. long. *Involucral spikelets* whorled, sessile, persistent, lanceolate, acute or acuminate, $\frac{1}{4}$–$\frac{5}{8}$ in. long, glabrous or with short bulbous-based hairs, male; glumes 3. *Pedicellate spikelets* linear-lanceolate, glabrous, on short glabrous or subglabrous pedicels. *Bisexual spikelet* solitary, $\frac{1}{4}$ in. long; callus reaching $\frac{1}{3}$ in. long, pungent, bearded with colored hairs. Lower invol.-glume obtuse or notched, smooth except the tip, dark brown, not dorsally channelled, obscurely 7–9-nerved; upper invol.-glume glabrous; lower floral glume glabrous, rather shorter than the invol.-glumes; upper floral glume awned; awn $1\frac{1}{2}$–$2\frac{1}{2}$ in. long with a stout hispid column. Anthers $\frac{1}{12}$ in. long. Grain $\frac{1}{10}$ in. long, oblong, grooved ventrally. *Themeda Forskahlii* (*Forskalii*) var. *vulgaris*, Hack. Monog. Andropog. in DC. Monog. Phan. v. 6 (1889) p. 660. *Anthistiria imberbis*, Retz. Obs. fasc. 3 (1783) p. 11; Hook. f. Fl. B. I. v. 7, p. 211; Trim. Fl. Ceyl. v. 5, p. 248; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Prain, Beng. Pl. p. 1207. *A. ciliata*, Retz. Obs. fasc. 3 (1783)

p 11 (*not* of Linn.); Grah. Cat. p. 239; Dalz. & Gibs. p. 304; Watt, Dict. Econ. Prod. v. 1, p. 265.

Common throughout the Presidency, largely used for hay.—DISTRIB. Hotter and drier parts of India; Ceylon, warm regions of the Old World.

2. **Themeda ciliata,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 664. Annual; stems suberect or geniculately ascending and rooting from the lower nodes, very slender, terete, 1–3 ft. high, glabrous, simple or branched. Leaves 6–12 by $\frac{1}{6}$–$\frac{1}{4}$ in., linear, acute, flat, flaccid, glabrous or hairy; sheaths glabrous or the upper with scattered bulbous-based hairs towards the mouth; ligules membranous, rounded, $\frac{1}{12}$ in. long, glabrous. Panicle suberect, occupying $\frac{1}{2}$–$\frac{2}{3}$ of the stem, usually dense; lower branches solitary or 2–3-nate, filiform, glabrous, undivided often to the middle, then bearing at equal distances usually shortly pedunculate dense clusters of racemes; spathes linear to subulate from a broad lanceolate base, $\frac{2}{3}$–1 in. long, glabrous or with scattered bulbous-based bristles; racemes $\frac{1}{3}$–$\frac{1}{2}$ in. long, erect. *Involucral spikelets* whorled, sessile, persistent, linear-lanceolate, acute or acuminate, $\frac{1}{6}$–$\frac{1}{4}$ in. long, reddish, barren or imperfectly male; lower invol.-glume beset along the winged keels with stiff bristles from large tubercular bases, otherwise glabrous. *Pedicellate spikelets* narrow, not winged, glabrous. *Bisexual spikelet* solitary, not exserted from the involucre, $\frac{1}{6}$–$\frac{1}{5}$ in. long, narrow, linear-lanceolate; callus very short, subobtuse, bearded with short reddish hairs; lower invol.-glume obtuse, brown, shining, obscurely 6–7-nerved; upper invol.-glume glabrous; lower floral glume shorter than the invol.-glumes, sometimes 2-toothed; upper floral glume awned; awn 1–1½ in. long, slender. Anthers $\frac{1}{25}$ in. long. *Anthistiria ciliata*, Linn. f. Suppl. (1781) p. 113; Hook. f. Fl. B. I. v. 7, p. 213; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Prain, Beng. Pl. p. 1207.—Flowers: Sept.-Jan.

KONKAN: S. Konkan, *Law*!; Salsette, *Jacquemont*, 717! DECCAN: *Woodrow*! S. M. COUNTRY: Belgaum, *Ritchie*, 886!—DISTRIB. India (North-west, Bengal, Central Provinces, W. Peninsula); S. Africa.

3. **Themeda cymbaria,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 668. Perennial; stems 3–8 ft. high, as thick as a swan's quill below, erect, branched, smooth, clothed at the base with broad strongly compressed equitant leaf-sheaths together 1½–2 in. across; internodes long; nodes glabrous or puberulous. Leaves 2–4 ft. by $\frac{1}{8}$–$\frac{1}{3}$ in., linear, finely pointed, glaucous beneath, green above, glabrous or ciliate at the base, scaberulous above, smooth beneath, margins scabrid; sheaths subcompressed, keeled, smooth, usually bearded at the mouth, the lower $\frac{1}{2}$ in. broad at the base; ligule reddish, membranous, glabrous. Panicle 1–2 ft. long, occupying nearly $\frac{1}{2}$ the stem, supra-decompound; branches loaded with small shortly pedunculate oblong fascicles $\frac{1}{2}$–$\frac{3}{4}$ in. long, of nearly glabrous racemes; proper spathes $\frac{1}{2}$–$\frac{2}{3}$ in. long, linear-lanceolate, boat-shaped, acuminate, finely pointed, glabrous or with hairy margins. *Involucral spikelets* $\frac{1}{6}$–$\frac{1}{4}$ in. long, contiguous in superposed pairs, glabrous. *Pedicellate spikelets* with glabrous pedicels. *Bisexual spikelets* solitary (rarely 2), subsessile; callus short, bearded with white hairs; lower invol.-glume $\frac{1}{4}$ in. long, dorsally convex, not channelled, smooth, polished, dark brown; awn $\frac{1}{2}$ in. long, slender, smooth. *Anthistiria Cymbaria*, Roxb. Hort. Beng.

(1814) p. 6; Grah. Cat. p. 239; Dalz. & Gibs. p. 304; Hook. f. Fl. B. I. v. 7, p. 215; Trim. Fl. Ceyl. v. 5, p. 249.

KONKAN: common.—DISTRIB. India (W. Peninsula); Ceylon.

4. **Themeda tremula,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 667. Annual?; stems erect or ascending from a creeping rootstock, 1–4 ft. high, stout or slender, leafy, subterete, simple or branched, smooth, polished, brown. Leaves 4–20 by $\frac{1}{6}$–$\frac{1}{3}$ in., finely acuminate with setaceous tips, rigid, suberect, green, glabrous or nearly so, margins scabrid; sheaths slightly compressed, smooth; ligule reduced to a very narrow membrane. Panicle 1–2 ft. long, occupying $\frac{1}{3}$–$\frac{1}{2}$ the stem, racemiform; fascicles of racemes rather distant, on capillary flexuous peduncles $\frac{1}{2}$–3 in. long, subflabelliform or subglobose, $\frac{1}{2}$–$1\frac{1}{2}$ in. broad, sometimes reduced to a few spathes and spikelets; outer spathes longer than the fascicles, 1–$1\frac{1}{2}$ in. long, more or less hairy with simple or bulbous-based hairs; proper spathes $\frac{1}{2}$–$\frac{3}{4}$ in. long, lanceolate, acute, compressed, glabrous or with some bulbous-based hairs, margins scarious. *Involucral spikelets* in contiguous superposed pairs reaching $\frac{1}{3}$ in. long, green tinged with red; lower invol.-glume linear-lanceolate, acuminate, covered with long often bulbous-based bristles, many-nerved; upper invol.-glume oblong-lanceolate, acuminate, 1-nerved, ciliate above the middle, margins inflexed; lower floral glume as long, very narrowly linear, hyaline, 1-nerved. *Lodicules* cuneate. Anthers $\frac{1}{10}$ in. long. *Pedicellate spikelets* like the involucral, but nearly glabrous. Glumes 3; lower invol.-glume winged on one margin, nerveless, the other two as in the involucral spikelets. *Bisexual spikelets* 2, sessile, $\frac{1}{6}$ in. long, linear-oblong, obtuse; callus small, with a short reddish beard; lower invol.-glume scabrid, deeply channelled dorsally, nerveless, tip hispid, narrowly truncate; awn $\frac{1}{2}$–1 in. long. *Anthistiria tremula,* Nees, ex Steud. Syn. Gram. (1855) p. 401; Hook. f. Fl. B. I. v. 7, p. 214; Trim. Fl. Ceyl. v. 5, p. 249; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Oct.

DECCAN: Poona, *Woodrow.*—DISTRIB. India (W. Peninsula); Ceylon.

34. **ISEILEMA,** Hack.

Small annual or perennial grasses; stems slender, compressed, many-noded. Leaves linear from a usually rounded equilateral base; sheaths compressed, keeled, shorter than the internodes. Panicle usually occupying $\frac{1}{2}$ the stem; branches usually fascicled and interspersed with scarious spathe-like bracts; proper spathes boat-shaped, acute, compressed, more or less herbaceous on the back, many-nerved, with scarious margins; racemes fasciculiform, solitary at the apex of the stem and branches, articulate with the peduncle below the lowest spikelets, at length all falling away from it. Spikelets dimorphous, the 4 lower whorled, male or neuter, forming an involucre round the inarticulate rhachis. *Involucral spikelets* pedicellate; pedicels short, flattened. Glumes 3; lower invol.-glume oblong-lanceolate, 3–5-nerved; upper invol.-glume similar, 3-nerved; floral glume hyaline, 1-nerved. Lodicules cuneate, retuse. Anthers violet. *Pedicellate spikelets* on long slender pedicels, similar to the involucral. *Bisexual spikelets* lanceolate or linear-lanceolate; lower invol.-glume truncate or shortly 2-fid at the

tip; upper invol.-glume as long, muticous, hyaline, glabrous; lower floral glume small, sometimes wanting; upper floral glume an awn longer than the spikelet.

As remarked by Hackel (Monog. Andropog. p. 679) the dispersion of the spikelets of *Iseilema* is by the wind carrying away all the spikelets in a body, whereas in *Themeda* the bisexual glumes alone disarticulate and are probably carried away by adhesion to the coats of animals.—DISTRIB. Tropical Asia and Australia; species 5.

Keel and submarginal nerves of the spathes granulate or tuberculate ..... 1. *I. Wightii.*
Keel and submarginal nerves of the spathe smooth ..... 2. *I. laxum.*

1. **Iseilema Wightii,** *Anders. in Nov. Act. Soc. Sc. Upsal.* ser. 3, v. 2 (1858) p. 251. Perennial; stems often prostrate and rooting at base, then ascending, 8–36 in. long, rarely as thick at the base as a goose-quill; nodes more or less bearded. Leaves 4–8 by $\frac{1}{12}$–$\frac{1}{8}$ in., linear, acute, glaucescent or sometimes as well as the whole plant reddish, smooth or scaberulous, the floral leaves scabrid with tuberculate margins; sheaths lax, sometimes with bulbous-based hairs; ligule short truncate, membranous, ciliate. Panicle occupying $\frac{1}{2}$ the stem or more, linear-oblong, more or less compound, erect, spreading; rhachis bearded at the nodes; lower branches 2, the upper as many as 5; proper spathes $\frac{1}{3}$–$\frac{1}{2}$ in. long, linear-lanceolate, with scarious margins. *Involucral spikelets* male or neuter, $\frac{1}{8}$ in. long, shortly pedicellate, lanceolate-oblong, green or tinged with violet; lower invol.-glume subacute, with 5 elevated ribs on the back, sulcate between the ribs; upper invol.-glume glabrous with broadly infolded margins, 1-nerved; lower floral glume much shorter, oblong, 2–3-toothed, nerveless, glabrous. Anthers $\frac{1}{16}$ in. long. *Pedicellate spikelets* on very slender pedicels. *Bisexual spikelets* $\frac{1}{16}$–$\frac{1}{8}$ in. long; lower invol.-glume acute (not acuminate nor beaked), obscurely 4-nerved; upper invol.-glume equalling the lower, elliptic-lanceolate, acute or subobtuse, often mucronate, obtusely keeled on the back, 3-nerved, glabrous; upper floral glume an awn $\frac{1}{4}$–$\frac{1}{2}$ in. long, the column exceeding the subulate part. Fl. B. I. v. 7, p. 218; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Watt, Dict. Econ. Prod. v. 4, p. 524. —Flowers: Nov.

DECCAN: Poona, *Woodrow.* S. M. COUNTRY: Belgaum, *Woodrow.* GUJARAT: Morvi (Kathiawar), *Woodrow.*—DISTRIB. Throughout India.

2. **Iseilema laxum,** *Hack. Monog. Andropog. in DC. Monog. Phan.* v. 6 (1889) p. 682. Perennial; stems 6–20 in. long, ascending from a stout hard sometimes shortly creeping rootstock, very slender, simple or sparingly branched; root-fibres wiry. Leaves all cauline or the lower radical with equitant sheaths, 3–6 by $\frac{1}{20}$–$\frac{1}{8}$ in., linear, obtuse or subobtuse, glabrous but often ciliate near the base, scaberulous above, smooth below, the margins scabrid; sheaths lax, quite glabrous; ligule short, truncate, membranous, ciliate. Panicle occupying $\frac{1}{3}$–$\frac{1}{2}$ the stem, racemiform, long, narrow, of distant axillary pedunculate fascicles $\frac{1}{4}$–$\frac{1}{2}$ in. long; outer spathes $\frac{1}{4}$–1 in. long, narrowly lanceolate, glabrous or with a few hairs near the margin; proper spathes $\frac{1}{3}$–$\frac{1}{2}$ in. long, elliptic-lanceolate. *Involucral spikelets* truly whorled, $\frac{1}{6}$ in. long, pedicellate, oblong-lanceolate, acute; pedicels short, flattened, bearded at

the base; lower involucre-glume acute, sparsely ciliate, 3–5-nerved; upper involucre-glume oblong-lanceolate, acuminate, sparsely ciliate, 3-nerved lower floral glume linear, glabrous, hyaline. Lodicules cuneate, retuse. Anthers long, narrow. *Pedicellate spikelets* on long ciliate pedicels, lanceolate, glabrous. *Bisexual spikelets* narrowly lanceolate, $\frac{1}{5}$ in. long, narrowed into a slender stipe, glabrous; lower involucre-glume chartaceous, 2-fid or truncate at the tip, margins scaberulous in the upper third, thin, faintly 3–5-nerved; upper involucre-glume lanceolate, acuminate, 1-nerved, tip scaberulous; upper floral glume a very slender geniculate awn, $\frac{1}{3}$–$\frac{1}{2}$ in. long, the column equalling the subulate part. Fl. B. I. v. 7, p. 218; Trim. Fl. Ceyl. v. 5, p. 251; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Prain, Beng. Pl. p. 1208; Watt, Dict. Econ. Prod. v. 4, p. 524.—Flowers: Nov.–Dec.

KONKAN: *Lambert*! DECCAN: *Woodrow*!; Poona, *Jacquemont*, 439! S. M. COUNTRY: Belgaum, *Ritchie*, 799!—DISTRIB. India (Upper Gangetic plain, W. Peninsula).

35. **COIX,** Linn.

Tall leafy monœcious annual or perennial grasses; stem branching, spongy within. Leaves long, flat, broad. Racemes many, axillary and terminal; lower spikelets solitary, female, enclosed in an ultimately hardened, polished, nut-like bract, through the apex of which the male portion of the spike protrudes. MALE SPIKELETS 2–3-nate at each node of the rhachis, 1 sessile and 1 or 2 pedicellate, lanceolate. Glumes 4; involucre-glumes subequal, empty, rigid or herbaceous; lower involucre-glume winged along the inflexed margin; upper involucre-glume not winged; floral glumes hyaline, paleate, triandrous or empty. FEMALE SPIKELETS ovoid, acuminate. Glumes 4; lower involucre-glume chartaceous, the other 3 glumes becoming successively thinner; upper floral glume paleate. Lodicules 0. Staminodes minute. Ovary ovoid; styles 2, free, slender. Grain orbicular, ventrally furrowed, enclosed in the hardened globose ovoid or cylindric involucre.—DISTRIB. Species 3 or 4, in the warmer regions of the globe.

1. **Coix Lachryma-Jobi,** *Linn. Sp. Pl.* (1753) p. 972. Stem 3–5 ft. high or more, stout, rooting at the lower nodes; internodes smooth, polished. Leaves 4–18 by 1–2 in., narrowed from a broad cordate base to an acuminate tip, smooth on both surfaces, with slender nerves and spinulosely serrate margins; midrib stout; sheaths long, smooth; ligule a very narrow membrane. Racemes 1–2½ in. long, nodding or drooping from long peduncles; rhachis within the bract slender, above the bract stout, notched at the nodes. MALE SPIKELETS $\frac{3}{8}$–$\frac{1}{2}$ in. long, subsecund, imbricating. Lower involucre-glume $\frac{3}{8}$ in. long, elliptic-lanceolate, acute, concave, many-nerved, with inflexed margins and with a narrow wing arising from a little above the edge of the margin with many branched green veins; upper involucre-glume similar to the lower but not winged, 5–9-nerved; lower floral glume oblong-lanceolate, hyaline, paleate, triandrous, faintly 3–5-nerved; upper floral glume similar, paleate, triandrous or empty. Anthers $\frac{1}{5}$ in. long, orange. FRUIT from broadly ovoid to globose, bluish-grey, $\frac{1}{4}$–$\frac{3}{8}$ in. long, smooth, polished. Fl. B. I. v. 7, p. 100; Trim. Fl. Ceyl. v. 5, p. 192; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain,

Beng. Pl. p. 1210. *Cóix Lachryma*, Linn. Syst. ed. 10 (1751) p. 1261; Grah. Cat. p. 240; Dalz. & Gibs. p. 289; Watt, Dict. Econ. Prod. v. 2, p. 492.—Flowers: Oct. VERN. *Rán-jondhala.*

KONKAN: *Graham.* DECCAN: *Graham*; Lanoli, *Woodrow*; Panchgani Ghát, *Cooke*! GUJARAT: *Graham.*—DISTRIB. Throughout the hotter and damper parts of India, wild or cultivated; Ceylon, Tropical Asia, cultivated in Africa and America.

36. **POLYTOCA,** Br.

Tall stout erect branching annual or perennial leafy monœcious grasses; stem spongy within; nodes bearded; flowering branches fascicled. Leaves long, flat. Inflorescence of spike-like racemes, terminating the branches, at first enclosed in spathiform bracts; racemes all male or with one or more female spikelets at the base. MALE SPIKELETS 2-flowered, sometimes imperfect. Glumes 4 (with sometimes a terminal rudimentary one), all subequal in length; invol.-glumes empty; lower invol.-glume herbaceous, shallowly concave, many-nerved, with a narrow membranous margin; upper invol.-glume narrower, ovate, acuminate, 5–9-nerved; lower floral glume membranous, oblong, acuminate, 3–5-nerved, paleate, triandrous; upper floral glume very slender, linear, hyaline, paleate, triandrous or empty. Lodicules 2, cuneate. Anthers long. FEMALE SPIKELETS broadly oblong, 1-flowered; lower invol.-glume thickly coriaceous, closely embracing the rhachis of the spike by its involute margins, with many obscure nerves, the other 3 glumes enclosed in the lower invol.-glume, hyaline; upper invol.-glume oblong, many-nerved; lower floral glume narrower, oblong, 3–5-nerved, empty; upper floral glume very narrow, truncate, 3-nerved, paleate. Styles very long; stigmas slender. Grain small, fusiform, terete, enclosed in the nut-like polished hardened glume.—DISTRIB. Species 8, tropical Asiatic and Australian.

Leaves 18–24 by 2–3 in.; lower invol.-glume of female spikelet 3-lobed at the tip ..... 1. *P. Cookei.*
Leaves 6–12 by ¼–⅜ in.; lower invol.-glume of female spikelet entire at the tip ..... 2. *P. barbata.*

1. **Polytoca Cookei,** *Stapf, in Hook. Icon. Plant.* v. 24 (1895) t. 2333. Annual; stem 3 ft. (or more) high, smooth; nodes bearded. Leaves 18–24 by 2–3 in., linear-lanceolate, acuminate, more or less hispid on both sides with bulbous-based hairs, and with thickened and ciliate margins; sheaths rather loose, striate, hairy with bulbous-based hairs; ligule short, subhyaline, hairy with yellowish hairs. Flowering branches fasciculately crowded in the axils of the upper leaves, each with a linear acuminate pubescent bract at the base. Male panicles reaching 3 in. long. MALE SPIKELETS ⅓ in. long, geminate, one longer than the other, shortly pedicellate or sessile. Glumes 4; lower invol.-glume lanceolate, acuminate, pubescent, many-nerved, with a hyaline more or less inflexed margin; upper invol.-glume slightly shorter and thinner than the lower one, with slender nerves. Floral glumes slightly shorter than the lower invol.-glume, glabrous, few-nerved, hyaline. Anthers 3, linear. FEMALE SPIKELETS ⅓ in. long; lower invol.-glume crustaceous, oblong, the margins connate at the base, closely embracing the upper invol.-glume, the apex with a 3-lobed crest the lateral lobes of which are obliquely truncate, the

midlobe emarginate; upper invol.-glume slightly shorter than the lower, oblong, acuminate; lower floral glume about equalling the upper invol.-glume, oblong, suddenly apiculate, 13–15-nerved; upper floral glume shorter than the lower, hyaline, nerveless, sometimes 2-fid. Fl. B. I. v. 7, p. 101; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436.—Flowers: Sept. VERN. *Kurisal.*

KONKAN: *Stocks*!, *Law*!, *Lisboa*; Bombay, *Dalzell*!; Salsette, *Jacquemont*, 706! DECCAN: Mahableshwar, *Woodrow*!, *Cooke*! KANARA: N. Kanara, *Lisboa*.—DISTRIB. India (W. Peninsula).

2. **Polytoca barbata,** *Stapf, in Fl. B. I.* v. 7 (1896) p. 102. Stem 3–6 ft. high, as thick as the little finger below, terete, smooth; nodes softly bearded. Leaves 6–12 by $\frac{1}{4}$–$\frac{7}{8}$ in., linear, acuminate, scabrid above, with a stout midrib and scabrid margins; sheaths long, smooth, glabrous or hairy; ligule a narrow ridge. Racemes paniculate, on slender peduncles; spathiform sheaths 1 in. long (or more), with a long awn at the tip; proper sheaths $\frac{1}{2}$ in. long, oblong, awned; male portion of the raceme appearing as if sessile on the top of the female spikelet, articulate with the internode below it which is embraced by the margins of the outer glume of the female spikelet; rhachis hardly articulate between the male spikelets. MALE SPIKELETS reaching $\frac{3}{8}$ in. long. Lower invol.-glume $\frac{1}{3}$ by $\frac{1}{6}$ in., ovate, acute, concave, pubescent. FEMALE SPIKELETS $\frac{1}{6}$ in. long, glabrous. Glumes 4; lower invol.-glume thickly coriaceous, white, shining, closely wrapped round the rhachis of the spike and the other glumes, obscurely many-nerved; tip entire. Trim. Fl. Ceyl. v. 5, p. 194; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1209. *Coix barbata*, Roxb. Fl. Ind. v. 3 (1832) p. 569; Dalz. & Gibs. p. 289.—Flowers: Sept. VERN. *Kánta-karvel.*

DECCAN: high hills round Junnar (Poona districts), *Dalzell & Gibson*; Poona, *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, Java.

37. **ARUNDINELLA,** Raddi.

Perennial or annual erect grasses. Leaves narrow. Spikelets paniculate, continuous with or imperfectly jointed on the pedicels; rhachilla not produced beyond the upper floret. Glumes 4, membranous, chartaceous or thinly coriaceous; invol.-glumes acute or acuminate, 3–5-nerved, the upper usually the longer; lower floral glume equalling the lower invol.-glume or slightly longer, 3–7-nerved, paleate, male or neuter (rarely 2-sexual); upper floral glume much shorter than the lower one, thin, 2-sexual (or sometimes ?female), entire or minutely 2-fid, 3–7-nerved, awnless or 1–3-awned (if 3-awned, the 2 lateral awns bristle-like, straight, the median awn geniculate). Paleæ of floral glumes linear or oblong, 2-keeled; flaps more or less auricled. Lodicules 2, minute. Stamens 3; anthers linear-oblong. Styles 2, distinct; stigmas short, laterally exserted. Grain oblong to ellipsoid, free within the upper floral glume and palea.—DISTRIB. Species about 25, mainly in Tropical Asia and America.

Upper floral glume with 3 awns.
Leaves less than 4 in. long; annuals.
A weak straggling grass; leaves glabrous or sparsely hairy, auricled and pectinately ciliate at the base; lateral awns from a triangular base ..... 1. *A. arenacea.*

An erect grass; leaves hispid with bulbous-based hairs, rounded at the base; lateral awns acicular ..... 2. *A. tuberculata.*
Leaves 6–12 in. long; a perennial grass ..... 3. *A. setosa.*
Awn of upper floral glume solitary.
Spikelets $\frac{1}{16}$–$\frac{1}{12}$ in. long (smallest of the genus) ..... 4. *A. tenella.*
Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long.
Plant scarcely 6 in. high; leaves 1–1½ in. long ..... 5. *A. pygmæa.*
Plants exceeding 6 in. high.
Annuals.
Stems reaching 1½ ft. high; leaves 1–4 in. long and as well as the sheaths clothed with long soft hairs. 6. *A. agrostoides.*
Stems reaching 3 ft. high; leaves 4–6 in. long and as well as the sheaths glabrous or nearly so ..... 7. *A. Metzii.*
Perennial; stem reaching 4 ft. high; leaves 8–12 in. long, sparsely hairy; sheaths glabrous or nearly so, auricled at the mouth ..... 8. *A. Lawii.*
Spikelets $\frac{1}{6}$–$\frac{1}{4}$ in. long.
Panicle branched; leaves 6–12 in. long.
Rootstock hard, creeping, not tuberous; panicle pyramidal or thyrsiform; rhachis angular, glabrous ... 9. *A. brasiliensis.*
Rootstock tuberous; panicle oblong; rhachis filiform, scaberulous ..... 10. *A. capillaris.*
Panicle spicate; leaves 1–1½ in. long ..... 11. *A. spicata.*
Upper floral glume awnless; a tall grass 6 ft. high; leaves 12–24 in. long ..... 12. *A. gigantea.*

1. **Arundinella arenacea,** *Munro, ex Thw. Enum. Pl. Zeyl.* (1864) p. 362. An annual weak straggling slender grass; stems ascending, leafy, 6–12 in. long, rooting at the lower nodes; nodes glabrous. Leaves ¾–2 by ¼–⅜ in., ovate-lanceolate, acute, flat, glabrous or sparsely hairy, strongly nerved, from an amplexicaul pectinately ciliate 2-auricled base; sheaths glabrous, the margins naked or ciliolate in the upper part; ligule linear, small, membranous. Panicle ½–1 in. long, ovoid-oblong, compact; branches very short. Spikelets ⅙ in. long (excluding the awns). Glumes 4; invol.-glumes distant at the base, 3–5-nerved, membranous; lower invol.-glume ⅙ in. long (including awn), lanceolate, acute, narrowed into a scaberulous awn; upper invol.-glume rather longer, notched at the tip, with a long scaberulous awn in the sinus; lower floral glume shorter than the upper invol.-glume, oblong, obtuse, dorsally mucronate, paleate, neuter or male, the palea oblong-obovate, 2-fid at the apex; upper floral glume 2-sexual or female, shorter than the upper invol.-glume, oblong, membranous, with 2 lateral tufts of white hairs, divided at the apex into 2 triangular lobes from each of which slender capillary awns issue; median awn about ⅜ in. long, the lower half brown, twisted, the upper half geniculate, pale, scabrid, subulate; palea linear-oblong, 2-fid at the apex. Fl. B. I. v. 7, p. 69; Trim. Fl. Ceyl. v. 5, p. 176; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434. *Arundinella Campbelliana,* Lisboa, in Journ. Bomb. Nat. v. 5 (1891) p. 346.—Flowers: Oct.

Dalzell without locality in Herb. Kew. KONKAN: Ratnagiri, *Woodrow.* DECCAN: Mahableshwar, *Lisboa*; Tiger Leap near Lanoli, *Woodrow!* S. M. COUNTRY: Rám Ghát, *Ritchie,* 890!; Castlerock, *Woodrow.*—DISTRIB. India (Khasia, Birma, W. Peninsula); Ceylon.

2. **Arundinella tuberculata,** *Munro, ex Lisboa, in Journ. Bomb. Nat.* v. 5 (1891) p. 344. Annual; stem erect or slightly decumbent at the base, 12–18 in. high, glabrous. Leaves 1–3½ by ⅛–½ in., linear-

lanceolate, acute, hispid with white bulbous-based hairs, base rounded; sheaths reaching 2 in. long, hispid with long white bulbous-based hairs; ligule a ridge of hairs. Panicle 3–6 in. long, narrowly oblong; rhachis angular; branches $\frac{1}{2}$–1 in. long, scaberulous. Spikelets ovoid, acute, pedicellate, single or geminate, $\frac{1}{6}$ in. long (excluding awns), clothed with long bulbous-based hairs. Glumes 4; lower invol.-glume $\frac{1}{6}$ in. long (including an awn of about $\frac{1}{25}$ in. long), 3-nerved, with bulbous-based hairs along the nerves, subcoriaceous; upper invol.-glume $\frac{1}{6}$ in. long (excluding the beak), ovate, acute, 5-nerved, with bulbous-based hairs along the nerves, narrowed into a beak as long as the body of the glume, subcoriaceous; lower floral glume rather more than $\frac{1}{6}$ in. long, elliptic-oblong, obtuse, 2-fid, glabrous, subcoriaceous, with incurved margins, paleate, male, the palea as long as the glume, oblong-lanceolate acute; upper floral glume rather more than $\frac{1}{10}$ in. long, lanceolate, acute, when ripe subcrustaceous, brown and scabrid; median awn reaching $\frac{1}{2}$ in. long, the lower half brown, twisted or not, the upper half straight, whitish, scaberulous; lateral awns acicular, transparent, $\frac{1}{12}$–$\frac{1}{10}$ in. long. Fl. B. I. v. 7, p. 69; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.—Flowers: Oct.

Dalzell without locality in Herb. Kew. KONKAN: *Stocks*! DECCAN: Poona, *Woodrow*.—DISTRIB. Central India.

3. **Arundinella setosa,** *Trin. Gram. Panic.* (1826) p. 63. Perennial; stem 1–3 ft. high, erect from a hard rootstock, slender, rigid, subtuberous at the base; nodes glabrous. Leaves 6–12 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear, finely acuminate, glabrous, pubescent or sometimes hispidly hairy; sheaths glabrous; ligule very small. Panicle 3–10 in. long, lax; branches 2–5 in. long, distant, suberect, filiform. Spikelets (including the mucro of the upper invol.-glume) reaching $\frac{1}{4}$ in. long (or more). Glumes 4; lower invol.-glume $\frac{1}{4}$ in. long, ovate-lanceolate, aristately acuminate, 3-nerved, hairy or almost glabrous; upper invol.-glume rather more than $\frac{1}{4}$ in. long, oblong-lanceolate, narrowed into a long awn with truncate tip, 5-nerved; lower floral glume $\frac{1}{5}$ in. long, obtuse, paleate, male, the palea $\frac{1}{8}$ in. long, oblong-lanceolate, subacute; upper floral glume $\frac{1}{8}$ in. long, ovate-lanceolate, acuminate, 2-sexual; palea as long as the glume, narrowly oblong-lanceolate, subacute; median awn more than $\frac{1}{4}$ in. long, brown below, pale above; lateral awns capillary, $\frac{1}{20}$ in. long. Fl. B. I. v. 7, p. 70; Trim. Fl. Ceyl. v. 5, p. 177; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1215.

KONKAN: near Bombay, *Ritchie*!—DISTRIB. India (W. Himalaya, Khasia Hills, Central India); Ceylon, Tonkin, China, Philippines.

4. **Arundinella tenella,** *Nees & Wight, ex Steud. Nom.* ed. 2, part 1 (1840) p. 143. Annual, nearly glabrous; stems solitary or tufted, erect, glabrous or with a few scattered hairs. Leaves 1–3 by $\frac{1}{4}$–$\frac{3}{4}$ in., ovate to linear-lanceolate, acuminate, membranous, many-nerved, sprinkled with a few slender soft hairs, base narrowed; sheaths usually glabrous with ciliate margins. Panicle 2–10 in. long, effuse, copiously branched; rhachis slender, strict, erect; branches alternate or the lower subverticillately fascicled, each with widely spreading capillary branches and branchlets. Spikelets the smallest of the genus, $\frac{1}{15}$–$\frac{1}{12}$ in. long; pedicels long, slender. Glumes 4; lower invol.-glume $\frac{1}{20}$–$\frac{1}{16}$ in. long, ovate-lanceolate, acute, thinly membranous, 3-nerved; upper invol.-

glume longer, $\frac{1}{16}$–$\frac{1}{12}$ in. long, ovate-lanceolate, cuspidately acuminate, 5-nerved; lower floral glume $\frac{1}{16}$ in. long, ovate, obtuse, paleate; upper floral glume $\frac{1}{25}$ in. long, lanceolate, scabrid above; awn solitary, about $\frac{1}{10}$ in. long, the lower part brown, slightly twisted, the upper part pale. Fl. B. I. v. 7, p. 71; Dalz. & Gibs. p. 292; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1215. *Arundinella pumila*, Steud. Syn. Pl. Gram. (1855) p. 114; Lisboa, in Journ. Bomb. Nat. v. 5 (1891) p. 345.—Flowers: Nov.

Bombay, *Lambert*! DECCAN: Karli and Khandala, *Jacquemont*, 631!; Lanoli, *Woodrow*; Mahableshwar, common under the shade of trees, *Dalzell*!, *Cooke*!, *Woodrow*, *Lisboa*.—DISTRIB. India (W. Himalaya, Behar, Central India, Khasia Hills W. Peninsula); Abyssinia.

5. **Arundinella pygmæa,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 72. A small slender plant scarcely 6 in. high; stem very slender. Leaves chiefly radical, 1–1½ by $\frac{1}{10}$ in., linear-lanceolate, nerveless except the strong midrib, with a few scattered long hairs and finely serrulate margins; sheaths glabrous. Panicle erect, effuse; rhachis filiform; branches few, capillary. Spikelets $\frac{1}{8}$ in. long (including the cuspidation of the upper invol.-glume), ovoid-lanceolate, hispidly hairy; pedicels very long, capillary. Glumes 4; lower invol.-glume $\frac{1}{12}$ in. long, ovate, 3-nerved, hispid with long hairs; upper invol.-glume $\frac{1}{8}$ in. long, ovate-lanceolate, cuspidately acuminate, 5-nerved, hispid with long hairs; lower floral glume $\frac{1}{12}$ in. long, ovate, obtuse, coriaceous, with incurved margins, obscurely 5-nerved; upper floral glume about $\frac{1}{25}$ in. long, elliptic-oblong; awn solitary, $\frac{1}{6}$–$\frac{1}{5}$ in. long, the lower half brown, the upper half pale. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.—Flowers: Sept.

KONKAN: crest of W. Ghâts, *Woodrow*. KANARA: N. Kanara, *Lisboa*. There is only one half sheet of very poor specimens in Herb. Kew., collected in N. Kanara by Dr. Lisboa.

6. **Arundinella agrostoides,** *Trin. Sp. Gram. Icon.* v. 3 (1836) t. 265. Annual; stem 8–18 in. long, stout or slender. Leaves 1–4 by $\frac{1}{4}$–$\frac{1}{2}$ in., flat, narrowed to the base, clothed with long soft hairs; sheaths softly hairy; ligule a ridge of hairs. Panicle 1–8 in. long, contracted; branches fascicled, suberect. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovoid-lanceolate, the lower half usually bristly; pedicels reaching $\frac{1}{8}$ in. long, slender, glabrous or nearly so. Glumes 4; lower invol.-glume ovate, acuminate, 3-nerved, usually with a few bristles on the lower half; upper invol.-glume $\frac{1}{8}$ in. long, ovate, cuspidately acuminate, 5-nerved; lower floral glume rather more than $\frac{1}{10}$ in. long, ovate-lanceolate, coriaceous, paleate, 3-nerved, the palea ovate-lanceolate, acuminate; upper floral glume about $\frac{1}{20}$ in. long, elliptic, obtuse, usually female; palea oblong, obtuse; median awn reaching $\frac{1}{5}$ in. long, the lower half twisted, brown, the upper half pale, geniculate above the twisted column; lateral awns 0. Fl. B. I. v. 7, p. 71; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.

KONKAN: *Wight*.

I have seen no specimens from Bombay. Woodrow includes the plant in his list of grasses in the 'Journal of the Bombay Natural History Society,' but does not appear to have collected it, as he gives no habitat.

7. **Arundinella Metzii,** *Hochst. in Miq. Anal. Bot. Ind.* part 2 (1851) p. 19. Annual, 1–3 ft. high; stems slender, erect. Leaves 4–6 by $\frac{1}{4}$–$\frac{1}{3}$ in., linear, glabrous or sparsely hairy; sheaths glabrous or sparsely hairy. Panicle 1–8 in. long, effuse; rhachis slender, smooth or subscaberulous; branches elongate, alternate or fascicled, 1–4 in. long. Spikelets $\frac{1}{8}$ in. long, ovoid-lanceolate. Glumes 4; lower invol.-glume $\frac{1}{10}$ in. long, ovate-lanceolate, with a slender mucro about $\frac{1}{30}$ in. long, strongly 3-nerved; upper invol.-glume $\frac{1}{8}$ in. long, similar, with a mucro about $\frac{1}{20}$ in. long, 5-nerved; lower floral glume elliptic, obtuse, $\frac{1}{10}$ in. long, 3-nerved, paleate, empty or male, the palea $\frac{1}{16}$ in. long, oblong-lanceolate, acute, hyaline; upper floral glume $\frac{1}{20}$ in. long, ovate, obtuse; palea as long as the glume, linear-lanceolate, subobtuse; awn solitary, $\frac{1}{4}$ in. long, the lower half brown, the upper pale. Fl. B. I. v. 7, p. 72; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434.—Flowers: Oct.

Deccan: Lanoli, *Woodrow.* Kanara: *Thomson*!—Distrib. India (W. Peninsula).

8. **Arundinella Lawii,** *Hook. f. in Trim. Fl. Ceyl.* v. 5 (1900) p. 180. Perennial; stems tufted, erect, 2–4 ft. high, leafy, smooth; nodes hairy. Leaves 8–12 by $\frac{1}{4}$ in., linear, finely acuminate, flat, sparsely hairy, with nearly smooth margins; sheaths elongate, glabrous or nearly so, auricled and ciliate at the mouth; ligule a tomentose lunate ridge. Panicle 12–20 in. long., pyramidal, decompound, effuse, drooping; rhachis slender, smooth; lower branches reaching 6 in. long, in distant fascicles, filiform, spreading, flexuous; branchlets capillary. Spikelets numerous, usually hairy, rather more than $\frac{1}{10}$ in. long (excluding the awns); pedicels very long. Glumes 4; lower invol.-glume about $\frac{1}{12}$ in. long (including a short slender awn about $\frac{1}{40}$ in. long), lanceolate, acute, 3-nerved, hairy on the nerves, thinly membranous; upper invol.-glume similar to the lower but longer (nearly $\frac{1}{5}$ in. long, including an awn of nearly $\frac{1}{10}$ in. long), 5-nerved, hairy on the nerves, thinly membranous; lower floral glume rather less than $\frac{1}{10}$ in. long, shorter than the upper invol.-glume, oblong, subobtuse, faintly 5-nerved, not awned, hyaline, paleate, the palea narrowly oblong, subobtuse with a faint median nerve; upper floral glume $\frac{1}{20}$–$\frac{1}{16}$ in. long, elliptic-lanceolate, acute, hyaline, usually 3-nerved, with incurved margins and a long filiform awn reaching $\frac{1}{2}$ in. long, 2-sexual. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435. *Arundinella agrostoides*, Hook. f. Fl. B. I. v. 7 (1896) p. 71 (partly).

Konkan: *Woodrow*, 35!; N. & S. Konkan, *Law*!—Distrib. India (W. Peninsula); Ceylon.

9. **Arundinella brasiliensis,** *Raddi, Agrost. Bras.* (1823) p. 37, t. 1, fig. 3. Perennial; rootstock stout, hard, creeping and sending out stout sheathed branches sometimes as thick as a goose-quill, or tufted and intricately branched; stems 1–5 ft. long, stout or slender, simple or branched, hairy or almost glabrous; nodes glabrous or pubescent. Leaves 6–12 by $\frac{1}{6}$–$\frac{2}{3}$ in., usually ciliate at the narrow base, glabrous or hairy; sheaths usually glabrous; ligule a minute ridge fringed with long hairs. Panicle pyramidal, thyrsiform or subcorymbose, 4–18 in. long; rhachis angular, usually glabrous; branches 1–10 in. long, few or many, fasciculate or subverticillate. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. long, subsecund, pedicellate, ovoid-lanceolate, usually glabrous. Glumes 4; lower invol.-

glume $\frac{1}{8}$ in. long, ovate-lanceolate, acuminate, subacute, 3-nerved, glabrous or (rarely) sparingly setose; upper invol.-glume $\frac{1}{5}$ in. long, ovate-lanceolate, acuminate, 5-nerved; lower floral glume $\frac{1}{6}$ in. long, elliptic-oblong, obtuse or shortly 2-fid, 3–5-nerved, paleate, empty or male, the palea $\frac{1}{8}$ in. long, lanceolate, hyaline; upper floral glume less than $\frac{1}{8}$ in. long, bearded at the base, narrowly ovate-lanceolate, scaberulous, 2-sexual; awn $\frac{1}{6}$ in. long, straight or slightly twisted, brown below, pale above; palea narrowly lanceolate, acute, as long as the glume. A very variable plant. The measurements have been taken from specimens with full-sized spikelets. *A. Ritchiei*, Munro, has smaller glumes and spikelets. The inflorescence of the Indian plant is generally more lax than that of the Brazilian, and the spikelets somewhat larger. Fl. B. I. v. 7, p. 73; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1215. *Arundinella striata*, Nees, in Kew Journ. Bot. v. 2 (1850) p. 102; Dalz. & Gibs. p. 293. *A. nepalensis*, Trin. Gram. Panic. (1826) p. 62; Lisboa, in Journ. Bomb. Nat. v. 5 (1891) p. 343. *A. Ritchiei*, Munro, ex Lisboa, in Journ. Bomb. Nat. l. c.—Flowers: Oct.

DECCAN: Mahableshwar, *Dalzell & Gibson, Lisboa*; Panchgani, *Woodrow*; Lanoli, *Lisboa*; Khandala, *Lisboa*. KANARA: N. Kanara, *Lisboa*.—DISTRIB. Throughout the hilly parts of India; China, Malaya, Australia, Tropical America.

10. **Arundinella capillaris,** *Hook. f. Fl. B. I.* v. 7 (1896) p. 74. Perennial, very slender; stem erect from a tuberous rhizome which is clothed with the woolly bases of leaf-sheaths; nodes glabrous. Leaves 6–12 by $\frac{1}{6}$–$\frac{1}{3}$ in., linear, acuminate, glabrous or hairy; sheaths glabrous, striate; ligule a ridge of hairs. Panicle oblong, 5–7 in. long; rhachis filiform, scaberulous; branches alternate, slender, 4–6 in. long. Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. long, glabrous, solitary or geminate; pedicels long, capillary, angular. Glumes 4; lower invol.-glume $\frac{1}{8}$ in. long, ovate, acute, with a long slender mucro, 3-nerved, with a scaberulous keel; upper invol.-glume reaching $\frac{1}{5}$ in. long, ovate-lanceolate, narrowed into a subcuspidate acuminate tip, 5-nerved; lower floral glume rather more than $\frac{1}{8}$ in long, ovate-oblong, subacute, 3-nerved, paleate, the palea $\frac{1}{8}$ in. long, oblong-lanceolate, acute, hyaline; upper floral glume $\frac{1}{8}$ in. long, lanceolate, acute, slightly scabrid; palea oblong-lanceolate, acute; awn nearly $\frac{1}{4}$ in. long, geniculate about the middle, easily breaking off. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435. *Arundinella mutica*, Nees, ex Steud. Syn. Gram. (1855) p. 116.—Flowers: Oct. VERN. *Kotir.*

KONKAN: Parel near Bombay, *Woodrow*. KANARA: Kála naddi, *Woodrow*.—DISTRIB. India (W. Peninsula).

11. **Arundinella spicata,** *Dalz. in Dalz. & Gibs. Bo. Fl.* (1861) p. 293. A small grass in appearance resembling a *Setaria*; stem 6–12 in. high, erect, simple. Leaves 1–1½ by $\frac{1}{4}$ in., linear-lanceolate, acute, densely hispid with long hairs; sheaths densely hispid; ligule a minute hairy ring. Inflorescence of cylindric racemes $\frac{3}{4}$–2 in. long. Spikelets $\frac{1}{4}$ in. long to top of upper invol.-glume; pedicels very short. Glumes 4; lower invol.-glume $\frac{1}{16}$–$\frac{1}{12}$ in. long, lanceolate, acuminate, with a few long bulbous-based hairs, 3-nerved; upper invol.-glume reaching $\frac{1}{4}$ in. long, narrowly lanceolate, attenuated into a long acuminate point, folded round and completely concealing the upper floral glume and its awn,

3-nerved and with a few scattered long hairs; lower floral glume $\frac{1}{10}$ in. long, lanceolate, acute, thinly membranous, glabrous, paleate, empty or male, the palea $\frac{1}{16}$ in. long, lanceolate, acute; upper floral glume $\frac{1}{20}$ in. long, oblong, obtuse, female or 2-sexual; palea lanceolate, acute, hyaline; awn $\frac{1}{6}$ in. long, the lower half brown, the upper pale, geniculate about the middle. Fl. B. I. v. 7, p. 77; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435.—Flowers: Nov.

DECCAN: common on the Mahableshwar Hills, *Dalzell & Gibson, Woodrow!, Cooke!*—DISTRIB. India, Western Peninsula, apparently endemic.

12. **Arundinella gigantea,** *Dalz. in Dalz. & Gibs. Bo. Fl.* (1861) p. 293. A tall grass; stems erect, smooth, terete, 6 ft. high, as thick as a goose-quill at 18 in. below the panicle; nodes glabrous. Leaves 1–2 ft. by $\frac{7}{8}$–$1\frac{1}{4}$ in., linear-lanceolate, finely acuminate, glabrous or sparsely hairy, many-nerved, base rounded or cordate; sheaths striate, sparsely hairy or almost glabrous; ligule a narrow glabrous membrane. Panicle subcorymbosely thyrsiform, 5–7 by 2–3 in.; rhachis stout, scabrid, angular, concealed by the numerous erect angular branches which are 2–4 in. long. Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long. Glumes 4; lower invol.-glume $\frac{1}{12}$ in. long, broadly ovate, acute, strongly 3-nerved, with a scaberulous keel; upper invol.-glume $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate, narrowed into an acuminate point, 5-nerved; lower floral glume $\frac{1}{12}$–$\frac{1}{10}$ in. long, ovate, subobtuse, 3–5-nerved, paleate, the palea $\frac{1}{16}$ in. long, elliptic, hyaline; upper floral glume $\frac{1}{16}$ in. long, elliptic, thickly coriaceous, white, without an awn. Fl. B. I. v. 7, p. 76; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435.—Flowers: Oct.

KONKAN: *Stocks!*; Kineshvar below the Ghâts, *Dalzell & Gibson.* S. M. COUNTRY: Castlerock, *Woodrow.*—DISTRIB. India (W. Peninsula).

38. **TRISTACHYA,** Nees.

Perennial, usually coarse grasses. Leaves various. Spikelets 2-flowered (lower flower male; the upper 2-sexual), large, lanceolate to linear, sessile or shortly pedicellate, in clusters of 3 at the tips of the branchlets of a raceme or panicle; rhachilla not produced beyond the upper floret. Glumes 4; invol.-glumes more or less unequal, not awned, persistent, 3-nerved, membranous or subcoriaceous; lower floral glume membranous, 3–7-nerved, not awned; upper floral glume membranous or ultimately cartilaginous, 2-lobed, with a long twisted awn in the sinus (copiously bearded above the middle in the Indian species); palea hyaline, 2-keeled. Lodicules 2, cuneate, fleshy. Stamens 3. Styles slender; stigmas plumose, laterally exserted. Grain narrow, free.—DISTRIB. Africa, Arabia, India, Beluchistan, Tropical America; species 11–12.

1. **Tristachya barbata,** *Nees, ex Steud. Syn. Pl. Gram.* (1855) p. 238. Stem 6–18 in., branched and woody at the base, geniculately ascending, the base clothed with tomentose leaf-sheaths; nodes woolly. Leaves 1–3 by $\frac{1}{10}$–$\frac{1}{6}$ in., linear-lanceolate from a rounded base, finely acuminate, pungent, rigid, glaucous, many-nerved, with a subserrulate thickened margin. Panicle 1–2 in. long and nearly as broad, sparingly branched; branches solitary and 2-nate, capillary. Spikelets nearly $\frac{1}{2}$ in. long (excluding the awn); callus glabrous. Glumes 4;

lower invol.-glume $\frac{1}{4}$ in. long, ovate-lanceolate, subacute, 3-nerved; upper invol.-glume $\frac{1}{3}$ in. long, oblong-lanceolate, 3-nerved; lower floral glume nearly $\frac{1}{2}$ in. long, male, lanceolate, acuminate, interruptedly 7-nerved, with a linear-lanceolate palea $\frac{1}{4}$ in. long; upper floral glume $\frac{1}{3}$ in. long, 2-sexual, densely hairy on the back above the middle with very slender hairs nearly $\frac{1}{6}$ in. long, 2-lobed, the lobes lanceolate, acute, aristate, each lobe 3-nerved, $\frac{1}{6}$ in. long with an awn $\frac{5}{8}$ in. long from the sinus; palea lanceolate, acute, $\frac{1}{4}$ in. long. Fl. B. I. v. 7, p. 272; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440. *Tristachya Stocksii*, Boiss. Fl. Orient. v. 5 (1881) p. 552.

SIND: *Stocks*, 1217! and 648!—DISTRIB. Arabia, Nubia.

39. **THYSANOLÆNA,** Nees.

A large glabrous reed-like grass; stems solid. Leaves broad, flat. Spikelets innumerable, very minute, 1-flowered, jointed on very short pedicels and subsecund on the very numerous crowded, long, filiform, compound, suberect branches and branchlets which form a very large effuse pyramidal panicle; rhachilla produced but not beyond the floret. Glumes 4; invol.-glumes small, concave, awnless, faintly nerved or nerveless; lower floral glume rather longer than the upper, empty, acuminate, epaleate; upper floral glume ovate, acute, ciliate with long erect white hairs; palea short, truncate. Stamens 2–3; anthers short. Styles free. Grain very minute, free within the hardened glumes.—DISTRIB. Tropical Asia; species 1.

1. **Thysanolæna Agrostis,** *Nees, in Edinb. N. Phil. Journ.* v. 18 (1835) p. 180. A large handsome grass; stem 4–12 ft. high, reaching sometimes $\frac{3}{8}$ in. in diam., glabrous, polished. Leaves very large, 1–2 ft. by 2–4 in., coriaceous, linear-lanceolate, tapering to a fine point, many-veined, base cordate; sheaths glabrous, striate, hairy at the mouth; ligule small, ciliate. Panicle large, 1–2 ft. long, soft, glabrous; branches very numerous, suberect, filiform, with many short branchlets carrying small spikelets. Spikelets $\frac{1}{20}$–$\frac{1}{16}$ in. long, ovoid-lanceolate, acuminate, pedicellate; rhachilla produced into a linear-lanceolate point about $\frac{1}{50}$ in. long. Glumes 4; invol.-glumes less than $\frac{1}{30}$ in. long, subequal, about $\frac{1}{2}$ as long as the floral glumes, ovate, subacute, hyaline, obscurely 1-nerved; lower floral glume longer than the upper, lanceolate, acuminate, membranous, glabrous, epaleate, empty, 1-nerved; upper floral glume ovate-lanceolate, acuminate, ciliate with long white erect hairs. Fl. B. I. v. 7, p. 61; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 434; Prain, Beng. Pl. p. 1172. *Thysanolæna acarifera*, Arn. & Nees, in Nov. Act. Cur. v. 19, Suppl. 1 (1843) p. 181; Duthie, Fodd. Grass. N. Ind. (1888) p. 21; Watt, Dict. Econ. Prod. v. 6, part 4, p. 48.—Flowers: Jan. VERN. *Barucha.*

KONKAN: Thána, *Lisboa.* DECCAN: Khandesh, *Lisboa*; Dangs, *Woodrow*; Nasik, *Lisboa.* GUJARAT: Bansda (Surat districts), *Woodrow.*—DISTRIB. Throughout India; Penang, eastwards to New Guinea.

40. **PHRAGMITES,** Trin. (ex parte).

Tall perennials with a creeping rhizome; stem stout, hollow, leafy upwards. Leaves long, flat. Panicle lax, usually very large and

decompound. Spikelets conspicuously silky from the long hairs on the callus, loosely 3–10-flowered, awnless; rhachilla disarticulating above the lower and between the following floral glumes, slender, penicillate with long hairs, not produced beyond the flowering glumes. Glumes glabrous; invol.-glumes unequal, oblong-lanceolate, acute, 3-nerved, membranous, persistent; floral glumes heteromorphous, the lowest linear-lanceolate, much exceeding the invol.-glumes, the following very thin, more or less caudate-acuminate, hyaline, 3-nerved; callus long, slender, densely clothed with very long silky hairs. Paleæ linear-oblong, about ½ as long as their glumes, 2-keeled. Lodicules 2 (sometimes 3 in the lower floret). Stamens 3 (sometimes 2 in the lower floret). Styles 2, distinct, rather short; stigmas laterally exserted, densely plumose. Grain oblong, semiterete. — DISTRIB. Species 2 (perhaps reducible to 1), almost cosmopolitan.

1. **Phragmites karka,** *Trin. ex Steud. Nom.* ed. 2, part 2 (1841) p. 324. Stems reaching 10 ft. high, smooth, simple or branched, covered with the leaf-sheaths. Leaves close, bifarious, linear, acuminate, reaching 1½ in. broad, coriaceous, smooth, base contracted, margins smooth; sheaths loose, glabrous, the mouth auricled; ligule a ciliate line. Panicle 1–2 ft. long, erect, oblong; branches widely spreading, filiform. Spikelets when fully expanded about ½ in. broad across the glumes; pedicels capillary, smooth; callus densely clothed with long silky hairs. Glumes glabrous; lower invol.-glume ⅛ in. long, oblong-lanceolate, acute, 3-nerved; upper invol.-glume rather less than ¼ in. long, oblong-lanceolate, acute, 3-nerved; lower floral glume less than ½ in. long; upper floral glume rather longer than the lower; palea $\frac{1}{10}$ in. long, linear-oblong. Anthers $\frac{1}{16}$ in. long. Fl. B. I. v. 7, p. 303; Trim. Fl. Ceyl. v. 5, p. 287; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1218. *Phragmites Roxburyhii*, Steud. Nom. ed. 2, part 2 (1841) p. 324; Watt, Dict. Econ. Prod. v. 6, part 1, p. 216.

Not common in the Bombay Presidency. DECCAN: Dhond, *Lisboa* ex *Woodrow*. SIND: *Stocks*, 1211!—DISTRIB. More or less throughout India; Tropical Asia, Afghanistan, Japan, Africa, Australia.

Woodrow in his list (Journ. Bomb. Nat.) gives *P. communis* as grown in gardens under the name of *Gardener's Garter*, but the *Gardener's Garter* which is commonly grown is *Phalaris arundinacea* var. *variegata*.

41. **ARISTIDA,** Linn.

Annual or perennial tufted grasses. Leaves flat or convolute. Spikelets panicled, 1-flowered, not articulate on their pedicels, laterally compressed; rhachilla not produced beyond the flowering glume. Glumes 3; invol.-glumes very narrow, long, 1-nerved, keeled, persistent, with or without a terminal awn; floral glume very narrow, cylindric, coriaceous, 3-nerved, tipped by 3 very long capillary awns (the 2 lateral awns occasionally short or obsolete); callus long, articulate at the base; palea minute, convolute round the ovary and grain. Lodicules 2, long, narrow, hyaline. Stamens 3; anthers long, narrow. Styles free, short; stigmas penicillate, laterally exserted. Grain long, narrow, cylindric, free in the convolute closely enveloping glume.—DISTRIB. Species about 100, in warm countries.

Awns not articulate on the floral glume, tripartite from the base without a column.
Invol. glumes not awned ..... 1. *A. Adscenscionis.*
Invol.-glumes awned.
Awns of invol.-glumes $\frac{1}{6}$ in long; spikelets $\frac{5}{8}$ in. long. 2. *A. setacea.*
Awns of invol.-glumes $\frac{1}{16}$ in. long; spikelets $\frac{3}{8}$ in. long. 3. *A. Hystrix.*
Awns with a twisted column.
Column of awns articulate on the floral glume.
Awn plumose ..... 4. *A. hirtigluma.*
Awn not plumose.
Stems less than 6 in. high; lower invol.-glume $\frac{1}{8}$ in. long ..... 5. *A. hystricula.*
Stems reaching 2 ft. high; lower invol.-glume $\frac{3}{8}$ in. long. 6. *A. funiculata.*
Column of awns not truly articulate on the floral glume, though readily separating; lower invol.-glume $\frac{1}{4}$ in. long ..... 7. *A. redacta.*

1. **Aristida Adscenscionis,** *Linn. Sp. Pl.* (1753) p. 82. Annual or perennial; stems 9–24 in. long, densely tufted, very slender, erect or ascending, simple or branched; branches erect, smooth. Leaves 3–12 by $\frac{1}{25}$–$\frac{1}{12}$ in., convolute, filiform, smooth or scaberulous; sheaths smooth, with rounded auricles; ligule of fine short hairs. Panicle 3–12 in. long, contracted, subsecund; rhachis filiform, smooth; branches short; pedicels short, capillary. Spikelets erect, $\frac{1}{4}$–$\frac{1}{3}$ in. long. Lower invol.-glume $\frac{1}{6}$ in. long, oblong-lanceolate, acute, membranous, often purple, with a scaberulous keel; upper invol.-glume lanceolate, $\frac{1}{4}$ in. long, 2-toothed and apiculate at the tip, the keels smooth; floral glume $\frac{1}{3}$ in. long, 3-nerved, smooth; awns 3, not articulate on the glume, the middle one larger than the lateral, $\frac{3}{8}$–$\frac{3}{4}$ in. long; callus long, pointed, hairy at the base; palea minute, oblong, hyaline, retuse. Fl. B. I. v. 7, p. 224; Trim. Fl. Ceyl. v. 5, p. 252; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Prain, Beng. Pl. p. 1211. *Aristida depressa,* Retz. Obs. fasc. 4 (1786) p. 22; Dalz. & Gibs. p. 295; Watt, Dict. Econ. Prod. v. 1, p. 312.—Flowers: Oct.–May.

On dry hills, *Dalzell & Gibson.* DECCAN: Poona, *Cooke!, Woodrow*; Bowdhan hill near Poona, *Woodrow,* 38! GUJARAT: Jetalsar (Kathiawar), *Woodrow,* 43!—DISTRIB. Throughout the plains and low hills of India; Ceylon, most warm countries.

A troublesome grass for those who have to walk through a patch of it; the ripe spikelets, which are easily detached, are like barbed arrows.

2. **Aristida setacea,** *Retz. Obs.* fasc. 4 (1786) p. 22. Perennial; stem 2–3 ft. high, stout, erect or geniculately ascending from a woody base, with stout wiry root-fibres, hard, smooth and polished, simple or subfastigiately branched. Leaves 6–12 by $\frac{1}{12}$–$\frac{1}{6}$ in., usually convolute, coriaceous, smooth; sheaths long, smooth; ligule of short hairs. Panicle various, 6–12 in. long, inclined, sometimes subsecund, open or contracted; rhachis slender, smooth; branches long or short, the lower sometimes reaching 4 in. long, filiform or capillary, usually fascicled and erect. Spikelets $\frac{5}{8}$ in. long (excluding awns), erect; pedicels capillary. Lower invol.-glume awned, $\frac{5}{8}$ in. long (including an awn of $\frac{1}{6}$ in. long), 1-nerved; upper invol.-glume a little longer than the lower (with an awn about $\frac{1}{6}$ in. long), notched at the insertion of the awn, and with hyaline margins, 1-nerved; floral glume $\frac{5}{8}$ in. long, 3-nerved; awns 3, inarticulate at the base, 1–1$\frac{1}{4}$ in. long, subequal or the middle the longest; callus long, bearded with long hairs. Stamens 3; anthers

$\frac{1}{6}$ in. long. Fl. B. I. v. 7, p. 225; Grah. Cat. p. 235; Dalz. & Gibs. p. 295; Trim. Fl. Ceyl. v. 5, p. 253; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Prain, Beng. Pl. p. 1211; Watt, Dict. Econ. Prod. v. 1, p. 312.

KONKAN: *Stocks*!; Salsette, *Graham*. DECCAN: Khandala, *Graham*. GUJARAT: Rajkot (Kathiawar), *Woodrow*.—DISTRIB. India (W. Peninsula, Behar); Ceylon, Mascarene Islands.

The grass is largely used for making the screens known as "tatties."

3. **Aristida Hystrix,** *Linn. f. Suppl.* (1781) p. 113. Perennial; stems 6–24 in. long, from a creeping rootstock, diffuse, ascending, sometimes proliferously branched. Leaves rather glaucous, $1\frac{1}{2}$–4 by $\frac{1}{16}$–$\frac{1}{8}$ in., convolute; sheaths glabrous, striate; ligule of soft hairs. Panicle 4–6 in. long and as broad as long, rigid; rhachis stout, flexuous and angular; branches and branchlets smooth. Spikelets (excluding awns) $\frac{3}{8}$ in. long, straw-colored. Lower invol.-glume $\frac{3}{8}$ in. long (including awn), lanceolate, acuminate, 1-nerved, with an awn of $\frac{1}{16}$ in. long, chartaceous; upper invol.-glume more than $\frac{1}{2}$ in. long (including an awn of $\frac{1}{16}$ in. long), lanceolate, acuminate, chartaceous, 1-nerved, quite glabrous, minutely toothed at the tip at the base of the awn; floral glume $\frac{3}{8}$ in. long; callus $\frac{1}{16}$ in. long, pointed, shortly villous; awns 3, not articulate with the glume, subequal or the middle one sometimes the longest, scabrid. Fl. B. I. v. 7, p. 225; Grah. Cat. p. 235; Dalz. & Gibs. p. 295; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Oct.

S. M. COUNTRY: Badami, *Cooke*!, *Woodrow*.—DISTRIB. India (Central Provinces, W. Peninsula).

4. **Aristida hirtigluma,** *Steud. Nom.* ed. 2 (1840) part 1, p. 131, *et Syn. Gram.* (1855) p. 144. Perennial; stems tufted, 1–2 ft. high, smooth, glabrous, terete, shining; nodes glabrous. Leaves 2–6 in. long, reaching $\frac{1}{20}$ in. broad when opened out, convolute, filiform with capillary tips; sheaths quite glabrous except for a few long hairs at the mouth, close; ligule a very narrow densely ciliate membrane. Panicle slender; branches short, erect, capillary. Spikelets pale green or straw-colored, linear-lanceolate. Lower invol.-glume $\frac{1}{3}$ in. long, linear-oblong, acute, scarious; upper invol.-glume a little longer, but similar; floral glume slightly muricate; callus about $\frac{1}{50}$ in. long, pointed, shortly villous; column of awn $\frac{1}{10}$–$\frac{1}{8}$ in. long, plumose with long slender hairs, articulated on the glume; middle branch $1\frac{1}{2}$ in. long or more, plumose in the lower half with long delicate hairs; lateral branches very slender, hair-like, about $\frac{1}{2}$ in. long, not plumose. Fl. B. I. v. 7, p. 227; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Aug.

SIND: *Dalzell*!; hill near Bullo Khan, *Woodrow*, 200!—DISTRIB. India (Panjáb, Peshawar, Sind); Egypt, Abyssinia.

5. **Aristida hystricula,** *Edgew. in Journ. Linn. Soc.* v. 6 (1862) p. 208. Annual, dwarf, slender, about 1–3 in. high, pale; stems many from the root, $\frac{1}{2}$–1 in. high, densely crowded; nodes glabrous. Leaves subulate, curved, convolute, acuminate, glabrous, less than 1 in. long; sheaths glabrous; ligule a small line of hairs. Panicle without the awns $\frac{1}{2}$–1 in. long, shorter than the awns, narrow, few-flowered;

branches few, short, erect. Spikelets $\frac{3}{8}$ in. long or more. Lower invol.-glume $\frac{1}{6}$–$\frac{1}{5}$ in. long, much shorter than the upper, ovate lanceolate, acute, apiculate, scarious; upper invol.-glume $\frac{3}{8}$ in. long, linear, running out into a slender awn or often cleft at the tip into 2 subulate lobes $\frac{1}{16}$ in. long; lower floral glume $\frac{1}{6}$ in. long; column of awn $\frac{1}{2}$ in. long, twisted, the 3 branches subequal, extremely slender, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Fl. B. I. v. 7, p. 227; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.

Sind: Jemadar ka Landa near Karachi, *Stocks*, 1187!—Distrib. India (Panjáb, Sind); Beluchistan.

6. **Aristida funiculata,** *Trin. & Rupr. in Mém. Acad. Pétersb.* sér. 6, v. 7 (1849) p. 159. Annual, very slender; stems 10–24 in. long, many, geniculately ascending. Leaves 2–6 by $\frac{1}{20}$–$\frac{1}{12}$ in., convolute or flat, ciliate at the base; sheaths glabrous; ligule a small ciliate membrane. Panicle 4–10 in. long, lax, narrow; rhachis angular; branches short, erect, capillary. Spikelets variable in length, $\frac{1}{2}$–$\frac{7}{8}$ in. long. Lower invol.-glume reaching $\frac{7}{8}$ in. long, linear-lanceolate, acute, 1-nerved, tapering into a slender awn; upper invol.-glume somewhat shorter than the lower, similar in shape and similarly awned; floral glume small, smooth, awned; awn articulate on the glume, the column $\frac{1}{2}$–$\frac{3}{4}$ in. long, twisted, with 3 capillary branches of which the middle is the longest, reaching $1\frac{1}{4}$ in. long. Fl. B. I. v. 7, p. 226; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439. *Aristida Royleana,* Trin. & Rupr. in Mém. Acad. Pétersb. sér. 6, v. 7 (1849) p. 160; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 358.—Flowers: Oct.

Deccan: Poona, *Lisboa*; Sattara, *Lisboa*; Sholapur, *Lisboa*; Dapuri near Poona, *Jacquemont*, 489! S. M. Country: Belgaum, *Woodrow*. Sind: Jam village, *Woodrow*, 19!—Distrib. India (Panjáb, Rajputana, W. Peninsula); Beluchistan, Arabia, Tropical Africa.

7. **Aristida redacta,** *Stapf, in Kew Bullet.* (1892) p. 85. Annual or sometimes perennial (and then more robust); stems tufted, 6–24 in. high, simple, or proliferously branched in robust specimens; nodes glabrous. Leaves 4–6 in. long, very slender, convolute, hairy above, smooth below, margins rough; sheaths glabrous; ligule narrow, shortly and densely ciliate. Panicle 9–10 in. long by $7\frac{1}{2}$ in. broad; branches usually twin, remote, at length spreading; pedicels unequal, shorter than the glumes. Spikelets on long or short capillary pedicels, green or purplish. Lower invol.-glumes subequal, narrowly lanceolate, finely acuminate, shortly aristate, reaching $\frac{1}{2}$ in. long; floral glume with a hairy callus, usually purplish, armed with an awn $1\frac{1}{4}$ in. long; column of awn capillary, twisted, easily separating from the glume but not truly articulate; branches 3 from the top of the column, the lateral much shorter than the middle one, sometimes 0. Fl. B. I. v. 7, p. 227; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439. *Stipa aristoides,* Stapf, ex Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 358; Prain, Beng. Pl. p. 1211.—Flowers: Oct.

Lisboa without locality in Herb. Kew. 5!; *Woodrow* without locality, 19! Deccan: *Woodrow*, 124!, *Lisboa*; Lanoli, *Woodrow*; Junnar (Poona districts), *Woodrow*. S. M. Country: Dharwar, *Talbot*, 2910! Kanara: *Law*!—Distrib. India (Central India, Nagpur, W. Bengal, W. Peninsula); S. Persia.

42. HELEOCHLOA, Host.

Rigid annual or perennial erect or prostrate grasses. Leaves flat or convolute. Spikelets 1-flowered, densely imbricate, in cylindric spike-like panicles laterally compressed; rhachilla not produced beyond the floral glume. Glumes 3, scarious, the invol.-glumes subequal or the lower shorter, keeled, 1-nerved, persistent; floral glume equalling the upper invol.-glume or longer, ovate or oblong, loosely 1-nerved, enwrapping the grain, membranous; palea oblong, obtuse or 2-fid, 2-nerved. Lodicules 2. Stamens 2 or 3. Styles elongate. Grain ovoid or ellipsoid, loose in the glume and palea.—DISTRIB. Species few, Oriental.

Annual; stems prostrate; panicles less than 1 in. long; filaments of anthers not thickened at the base; a herb of dry ground	1. *H. schœnoides.*
Perennial; stems erect or ascending; panicles reaching 3½ in. long; filaments of anthers thickened at the base; a herb of salt-water creeks	2. *H. dura.*

1. **Heleochloa schœnoides,** *Host, Gram.* v. 1 (1801) p. 23, t. 30. Annual; stems prostrate, spreading in a circle round the root, 1–6 in. long, glabrous, smooth, more or less striate, rigid; nodes glabrous. Leaves 1–2 in. long, narrowly lanceolate, acuminate; sheaths more or less inflated, ribbed, hairy at the mouth and with membranous (sometimes ciliate) margins; ligule a dense ring of long slender hairs. Inflorescence a spike-like ovoid-oblong, compressed panicle ½–¾ in. long, sessile on the greatly dilated sheath of the uppermost leaf. Spikelets densely imbricate, ⅛ in. long. Glumes 3; lower invol.-glume $\frac{1}{10}$ in. long, linear-lanceolate, folded, glabrous except for the ciliate keel, scarious, 1-nerved; upper invol.-glume a little longer than the lower, ovate-lanceolate, acute, scarious, with ciliate keel, 1-nerved; floral glume nearly ⅛ in. long, broadly ovate, acute, membranous, 1-nerved, the keel nearly glabrous; palea oblong, obtuse. Stamens usually 3; filaments very long, not thickened at the base; anthers small. Grain $\frac{1}{20}$ in. long, oblong-ellipsoid, compressed. Fl. B. I. v. 7, p. 235; Duthie, Fodd. Grass. N. Ind. p. 48; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Dec.

SIND: Bhubak, *Cooke!*, *Woodrow.*—DISTRIB. India (Panjáb, W. Himalaya, Kashmir, Bandelkand, Sind); westward to the Atlantic.

2. **Heleochloa dura,** *Boiss. Fl. Orient.* v. 5 (1881) p. 477. Perennial, pale, clothed all over with minute velvety pubescence; stems stout, ascending, 6–10 in. long, densely fastigiate from a woody inclined base which is clothed with leaf-sheaths, about $\frac{1}{10}$ in. in diam., hard, few-leaved; nodes glabrous. Leaves 3–6 in. long, involute, terete, rigid, pungent; sheaths short, coriaceous, glabrous; ligule a narrow line of hairs. Inflorescence a spike-like panicle reaching 3½ by ⅙ in., solitary at the top of the stem. Spikelets densely imbricate, $\frac{1}{10}$ in. long. Glumes 3, all 1-nerved and with ciliate keels; lower invol.-glume $\frac{1}{15}$ in. long, linear-oblanceolate, acute, apiculate; upper invol.-glume $\frac{1}{12}$ in. long, linear-oblanceolate, apiculate; floral glume $\frac{1}{10}$ in. long, elliptic-oblong, obtuse, mucronate; palea $\frac{1}{12}$ in. long, 2-fid, with obtuse ciliate lobes, 2-nerved. Stamens usually 2, less commonly 3; filaments very long, thickened at the base; anthers short. Fl. B. I.

v. 7, p. 236; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Dec.

Dalzell without locality in Herb. Kew.! GUJARAT: Dwarka (Kathiawar), *Woodrow*. SIND: salt-water creeks, *Stocks*, 455!—DISTRIB. Arabia.

43. **WOODROWIA,** Stapf.

Annual. Leaves narrow, flat. Panicle terminal, contracted, peduunculate; rhachis short; branches very slender, simple. Spikelets 2–5, girt at the base with short shining hairs, 1-flowered, arranged along the inarticulate branches of the panicle, articulated with the pedicel which is dilated at the apex, laterally compressed, the flower hermaphrodite. Glumes 3; invol.-glumes empty, acute, more or less thickened on the rounded back, obscurely 1-nerved; lower invol.-glume longer and broader than the upper; floral glume about as long as the upper invol.-glume, hyaline, 1-nerved, 2-lobed at the apex, with a slender geniculate awn between the lobes; palea hyaline. Lodicules 2, cuneate, lobulate. Stamens 2. Styles distinct; stigmas narrowly plumose, laterally exserted. Grain slender, cylindric, free within the glumes.—DISTRIB. W. Peninsula of India; species 1.

1. **Woodrowia diandra,** *Stapf, in Hook. Icon. Pl.* (1896) t. 2447. An annual grass 1½–2 ft. high. Lower leaves 3–4 by $\frac{1}{12}$–$\frac{1}{6}$ in., narrowly linear, setaceously acuminate; uppermost leaves reduced or entirely suppressed, hirsute, margins scabrid; sheaths close, glabrous or hairy at the mouth; ligule short, truncate, ciliolate. Panicle about 2 in. long; rhachis slender; pedicels very short, $\frac{1}{25}$ in. long; branches of panicle about 4. Spikelets ¼ in. long, rather distant, green or tinged with violet. Glumes 3; lower invol.-glume more or less dorsally hairy, with ciliolate margins; upper invol.-glume with a densely ciliate keel; floral glume 2-lobed, with a geniculate awn about ½ in. long from the sinus; column of awn ⅛ in. long, spirally ciliate, brown, the upper part of the awn yellow, longer than the column; palea obovate-oblong, hyaline, nerveless. Lodicules unequally lobed. Grain yellow, glabrous, ¼–⅓ in. long. Fl. B. I. v. 7, p. 241; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Sept.–Oct. VERN. *Kotir.*

DECCAN: Lanoli, *Woodrow*, 24!—DISTRIB. India, W. Peninsula.

44. **GARNOTIA,** Brongn.

Erect, perennial (rarely annual), stout or slender grasses. Leaves flat or convolute. Spikelets paniculate, very small, narrow, terete, 1-flowered, solitary or 2-nate, jointed on their pedicels; rhachilla not produced beyond the floret. Glumes 3; invol.-glumes subequal, lanceolate, acute, acuminate or awned, strongly 3-nerved, empty; floral glume as long as the invol.-glumes, lanceolate, acuminate or awned, thinly coriaceous or membranous, quite smooth, faintly 1-nerved, paleate, 2-sexual, tip acute or minutely 2-dentate; awn rarely jointed, sometimes geniculate, slender, scaberulous; palea as long as the glume, linear, the lobes minutely auricled at the base. Lodicules 2. Stamens 3; anthers linear. Styles free; stigmas with simple hairs, laterally exserted. Grain linear or oblong, dorsally compressed, free within

the glume and palea.—DISTRIB. Species about 20, Asiatic and Polynesian.

Leaves 1–? in. long; a small plant 2–8 in. high growing on trees amongst moss ..... 1. *G. arborum.*
Leaves 3–8 in. long; a terrestrial plant 1–2 ft. high..... 2. *G. stricta.*

1. **Garnotia arborum,** *Stapf, MS. ex Woodrow, in Journ. Bomb. Nat.* v. 13 (1901) p. 439. A low stiff erect annual grass 2–8 in. high, growing on trees amongst moss; stems tufted, terete, smooth, shining, glabrous, often tinged with red; nodes pubescent. Leaves 1–2 by $\frac{1}{16}$–$\frac{1}{8}$ in., linear, acuminate, glabrous; sheaths glabrous, striate; ligule a narrow lacerate membrane. Inflorescence paniculate; branches 2–3, fascicled on the rhachis, the clusters $\frac{1}{4}$–$\frac{3}{4}$ in. apart, angular, stout, truncate. Spikelets 1-flowered, articulate on the ends of the branches, early deciduous. Lower invol.-glume $\frac{1}{10}$–$\frac{1}{8}$ in. long, membranous, 3-nerved, the nerves hispid, the midrib produced into an awn equalling the glume or less; upper invol.-glume similar; floral glume nearly equalling the invol.-glumes, but more coriaceous, 2-toothed, with an awn $\frac{3}{4}$ in. long from between the teeth, obscurely nerved; palea hyaline, slightly smaller than the glume, acute, with large flaps at the base, nerveless. Stamens 3; anthers $\frac{1}{40}$ in. long. Grain $\frac{1}{10}$ in. long, ovoid-lanceolate, acute at the apex, rounded at the base.—Flowers: Sept.

DECCAN: on trees at Nandgaon on the crest of the Ghâts 10 miles S. of Lanoli, *Woodrow*, 30!—DISTRIB. India (W. Peninsula).

2. **Garnotia stricta,** *Brongn. in Duperr. Voy. Bot.* (1829) p. 133, t. 21. Annual?; stems 1–2 ft. long, tufted, geniculate and often branched at the base, smooth, glabrous. Leaves 3–8 by $\frac{1}{10}$–$\frac{3}{8}$ in., lanceolate or linear-lanceolate, glabrous or hirsute, or scabrous above, the margins flat or hirsute; sheaths usually glabrous; ligule a narrow ciliate membrane. Panicle 2–8 in. long, very narrow; branches in distant fascicles, scaberulous. Spikelets pale, $\frac{1}{10}$–$\frac{1}{8}$ in. long, sparsely hairy at the base. Lower invol.-glume ovate-lanceolate, finely acuminate, 3-nerved, the midnerve sometimes excurrent; upper invol.-glume similar; floral glume entire or notched, usually awned, the awn $\frac{1}{2}$ in. long or less. Fl. B. I. v. 7, p. 243; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Prain, Beng. Pl. p. 1214; Watt, Dict. Econ. Prod. v. 3, p. 483.

KONKAN: between Neral and Karjat, *Woodrow*!—DISTRIB. India (Himalayas, Khasia Hills, Behar, W. Peninsula); Sandwich Islands.

45. **TRACHYS,** Pers.

A diffuse softly villous annual grass. Leaves ovate-lanceolate. Inflorescence of 2–3 spikes radiating from the top of a long peduncle; rhachis broad, herbaceous, jointed, each joint bearing on the under surface at the articulation a solitary globose cluster of 2–3 perfect 1-flowered glabrous spikelets surrounded by many short spinescent glumes of imperfect ones. Glumes 4, very unequal; lower invol.-glume minute, tooth-like; upper invol.-glume elongate, linear-lanceolate, very acute, membranous, strongly nerved; lower floral glume much the largest, obliquely ovate or obovate-oblong, cuspidately acuminate, rigidly coriaceous, 9–many-nerved, paleate, empty, the palea minute; upper

floral glume much shorter and narrower than the lower one, linear-oblong, acuminate, chartaceous, smooth, dorsally convex, with incurved margins, 2-sexual; palea as long as the glume, acuminate, hyaline, the margins inflexed below the middle. Lodicules very minute or 0. Stamens 3; anthers linear. Styles very long; stigmas slender, penicillate, exserted at the top of the glume. Grain oblong, compressed, free within the glume and palea.—DISTRIB. India, Ceylon; species 1.

1. **Trachys mucronata,** *Pers. Syn.* v. 1 (1805) p. 85. Stems 6–18 in. long, ascending or prostrate, leafy, glabrous; nodes villous. Leaves 1–4 by $\frac{1}{4}$–$\frac{1}{2}$ in., ovate-lanceolate, acuminate, flaccid, softly villous on both surfaces, margins often crisped, base rounded; sheaths glabrous or hairy; ligule a thin membrane. Peduncles reaching 8 in. long, slender, shining. Spikes 1–2 by $\frac{1}{10}$–$\frac{1}{6}$ in., stipitate, the stipes $\frac{1}{10}$–$\frac{1}{4}$ in. long, glabrous and more or less angular; rhachis rigidly herbaceous, with a broad flat midrib and broad closely nerved wings. Clusters of spikelets reaching $\frac{1}{4}$ in. in diam., often partially sunk in a concavity of the rhachis; perfect spikelets reaching $\frac{1}{4}$ in. long, the imperfect much shorter. Glumes 4; lower invol.-glume $\frac{1}{16}$–$\frac{1}{12}$ in. long, lanceolate, acute; upper invol.-glume $\frac{1}{6}$ by $\frac{1}{16}$ in., linear-lanceolate, very acute, 3-nerved, hyaline; lower floral glume $\frac{1}{5}$ by $\frac{1}{8}$ in., broadly and obliquely ovate or obovate, cuspidately acuminate, with many green nerves, paleate, the palea $\frac{1}{20}$ in. long, oblong, obtuse, hyaline; upper floral glume $\frac{1}{8}$ by $\frac{1}{16}$ in., ovate, acute. Fl. B. I. v. 7, p. 96; Trim. Fl. Ceyl. v. 5, p. 186; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435. *Panicum squarrosum,* Retz. Obs. fasc. 4 (1786) p. 15; Roxb. Cor. Pl. v. 3, t. 206.—Flowers: Aug. VERN. *Devabhata.*

S. M. COUNTRY: Dharwar, *Woodrow*; Badami, *Cooke*!, *Woodrow*!—DISTRIB. India (W. Peninsula); Ceylon.

46. **TRAGUS,** Haller.

Annual or perennial grasses; stems erect, ascending or decumbent. Leaves linear, rather rigid, with cartilaginous spinulously ciliate margins; ligule a delicate ciliate rim. Spikelets in deciduous clusters of 2–4, on the filiform continuous axes of cylindric spike-like racemes or panicles. Lower invol.-glume minute, hyaline or suppressed; upper invol.-glume 5-ribbed or 5-nerved, membranous between the hispid or spinous-hooked ribs or nerves, exceeding the floral glume; floral glume solitary, lanceolate or oblong-lanceolate, membranous, 3-nerved, 2-sexual; palea as long as the glume, 2-nerved. Lodicules 2, broad, cuneate, fleshy. Stamens 3. Styles distinct, very slender; stigmas narrow, plumose, exserted from the top of the glume. Grain oblong to ellipsoid, free within the glume and palea.—DISTRIB. Species 2; one in South Africa, the other throughout the warmer parts of both hemispheres.

1. **Tragus racemosus,** *Scop. Introd.* (1777) p. 73. Stems tufted, leafy below, simple or branched, the branches often fasciculate and densely leafy, geniculate, ascending from a decumbent base or wholly decumbent, from a few inches to 1 ft. long; nodes glabrous. Leaves variable in length, $\frac{1}{4}$–$1\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{6}$ in., linear-lanceolate, acuminate, flat or undulate, rigid, very glaucous, subpungent, smooth, with pectinately

ciliate margins, closely striate; lowest sheaths short, broad, pale, the intermediate ones more or less herbaceous, the uppermost tumid, usually embracing the base of the panicle; ligule a slender ciliate rim. Inflorescence a cylindric spike-like panicle $\frac{3}{4}$–3 in. long; rhachis slender, straight or slightly undulate, pubescent. Spikelets $\frac{1}{8}$ in. long, acute, usually 2 facing each other and appearing like a single spikelet with 2 equal echinate glumes; pedicels stout, about $\frac{1}{30}$ in. long. Glumes 3 or 2; lower invol.-glume very minute, about $\frac{1}{50}$ in. long, hyaline, often suppressed; upper invol.-glume $\frac{1}{8}$ in. long, slightly curved, involute, enveloping the floral glume, strongly 5-ribbed, with rows of stout hooked spines along the ribs, thin between the ribs; floral glume solitary, $\frac{1}{12}$ in. long, oblong-lanceolate, shortly apiculate. Fl. B. I. v. 7, p. 97; All. Fl. Pedem. v. 2 (1785) p. 241; Trim. Fl. Ceyl. v. 5, p. 187; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1186. *Lappago biflora*, Roxb. Fl. Ind. v. 1 (1832) p. 281; Grah. Cat. p. 234. *Lappago aliena*, Spreng. Neue Entdeck. v. 3 (1822) p. 15; Dalz. & Gibs. p. 295.—Flowers: Sept.

KONKAN: Salsette, *Graham*. DECCAN: Bijapur, *Cooke*!, *Woodrow*!; Poona, *Jacquemont*, 386! S. M. COUNTRY: Badami, *Woodrow*! GUJARAT: Domas, near Surat, *Law* ex *Graham*; Rajkot (Kathiawar), *Woodrow*. SIND: *Stocks*!, *Dalzell & Gibson*.—DISTRIB. More or less throughout the dry plains of India; Ceylon, all warm countries, Southern Europe.

47. **LATIPES,** Kunth.

A perennial rather rigid grass. Leaves subulate, convolute. Spikelets 1-flowered, in simple spike-like racemes, 2-seriate (1 usually imperfect), persistent on the flattened truncate spreading articulate pedicels; rhachis flexuous. Glumes 3; invol.-glumes thickly coriaceous; lower invol.-glume usually the longest, narrow, recurved, 3-nerved, with pectinate margins, dorsally smooth; upper invol.-glume lanceolate, spinulously tuberculate, embracing the floral glume; floral glume solitary, shorter than the upper invol.-glume, oblong, acute, hyaline; palea minute, linear-oblong. Lodicules 2, hyaline. Stamens 3; anthers oblong. Styles free. Grain free, obliquely ovoid-lanceolate.—DISTRIB. India, Beluchistan, Arabia, Abyssinia, Senegal; species 1.

1. **Latipes senegalensis,** *Kunth, Revis. Gram.* v. 1 (1829) p. 261, t. 42. Stems 3–12 in. long, wiry, creeping, with many erect or spreading branches, leafy. Leaves 1–3 in. long, subulate, convolute; sheaths glabrous, the mouth hairy; ligule 0. Racemes 2–6 in. long; rhachis glabrous; pedicels distant, $\frac{1}{10}$ in. long, cuneate, flattened, with winged and ciliate margins, bearing at the broad apex 2 purplish-brown spikelets one perfect, the other not. Glumes 3; lower invol.-glume rather more than $\frac{1}{8}$ in. long, lanceolate, narrow, recurved, 3-nerved, with pectinate margins, purplish-brown; upper invol.-glume rather more than $\frac{1}{10}$ in. long, ovate-lanceolate, purplish-brown, tuberculate on the back; floral glume solitary, $\frac{1}{18}$ in. long, ovate-oblong, acute, hyaline. Fl. B. I. v. 7, p. 97; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435.—Flowers: Sept.

SIND: Jemadar ka Landa near Karachi, *Stocks*, 1186!; 20 miles N. of Karachi, *Woodrow*.

48. **ZOYSIA,** Willd.

A small rigid glabrous grass, with a long wiry rootstock giving off short erect leafy branches terminating in solitary pedunculate spike-like racemes. Leaves distichous, subulate, concave, pungent. Spikelets ovoid, laterally compressed, 1-flowered, articulate on short or rather long stout angular pedicels appressed to a rigid rhachis. Glumes 2; invol.-glume empty, rigidly coriaceous, the margins closely appressed as if connate, with a membranous tip, nerveless; floral glume much smaller than and completely enclosed in the invol.-glume, ovate-lanceolate, hyaline, 1-nerved; palea linear-oblong, hyaline. Lodicules 0. Stamens 3; anthers long. Styles very long, connate below; stigmas plumose, exserted at the top of the spikelet. Grain oblong, free within the glume and palea.—DISTRIB. Tropical Asia, Australia, and Mauritius; species 1.

1. **Zoysia pungens,** *Willd. in Ges. Naturf. Fr. Neue Schrift.* v. 3 (1801) p. 441. Rootstock rigid, wiry, up to 2–3 ft. long, the branches interlaced and rooting, sending up short leafy stems 6–10 in. high. Leaves 1–3 in. long, coriaceous, dorsally rounded, subulate, concave, pungent; sheaths short; ligule a narrow ciliolate membrane. Racemes 1–1½ in. long, strict, erect. Spikelets ⅛ in. long, erect; pedicels usually short, angular. Invol.-glume biconvex, much compressed at the membranous tip, smooth and shining, thickly coriaceous; floral glume shorter and much narrower, hyaline; palea linear-oblong, nerveless. Fl. B. I. v. 7, p. 99; Trim. Fl. Ceyl. v. 5, p. 188; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1186.

GUJARAT: Damaun, *Lisboa*. I have seen no specimens from the Bombay Presidency; there are none in Herb. Kew.—DISTRIB. of the genus.

49. **PEROTIS,** Ait.

Small annual or subperennial grasses; stems tufted, leafy. Leaves usually broad, rigid and ciliate; ligules hyaline or 0. Spikelets very small, linear-lanceolate, sessile or subsessile on the continuous rhachis of a spike or a lax spike-like raceme, articulate on and falling entire from the rhachis or the very short pedicels. Glumes 3; invol.-glumes equal, empty, linear-lanceolate, rigidly membranous, with a strong midrib produced into a long capillary awn; floral glume solitary, lanceolate, acute, hyaline, 1-nerved, 2-sexual; palea narrow, hyaline, nerveless. Lodicules 2, broad, cuneate. Stamens 3. Styles short; stigmas plumose, laterally exserted. Grain cylindric, slender, exserted from the unchanged floret and enclosed with it in the invol.-glumes.—DISTRIB. Species 2 or 3, in the Tropics of the Old World and in subtropical Australia.

1. **Perotis latifolia,** *Ait. Hort. Kew.* v. 1 (1789) p. 85. Stems tufted, geniculate, suberect, ascending, 3–15 in. long, glabrous. Leaves ½–1½ by ⅛–⅓ in., ovate or lanceolate, from a broad amplexicaul base, acute or acuminate, flat or somewhat undulate, glaucous, with rigidly ciliate margins; ligule 0. Racemes slender, 2–8 in. long, dense; rhachis subterete, glabrous. Spikelets $\frac{1}{12}$ in. long, narrowly linear, subterete, scaberulous. Invol.-glumes equal and similar, often purple, linear-lanceolate, each with a long scaberulous awn reaching sometimes

as much as $\frac{5}{8}$ in. long, purple or yellow; floral glume solitary, very narrowly linear, rather shorter than the invol.-glumes. Grain $\frac{1}{16}$ in. long, almost cylindric. Fl. B. I. v. 7, p. 98; Grah. Cat. p. 237; Dalz. & Gibs. p. 296; Trim. Fl. Ceyl. v. 5, p. 189; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1186.—Flowers: Oct.–Aug. VERN. *Kuras.*

KONKAN: Malwán, *Woodrow.* S. M. COUNTRY: Badami, *Cooke!*, *Woodrow!* GUJARAT: Baroda, *Cooke!*; Surat, *Lisboa*; Domas (near Surat), *Dalzell & Gibson.*—DISTRIB. More or less throughout India; Ceylon, S. Africa.

50. **SPOROBOLUS,** Br.

Perennial (rarely annual) glabrous grasses, erect or prostrate, or creeping. Leaves narrow, flat or convolute. Spikelets 1-flowered, small or minute, in effuse or contracted panicles, articulate on their pedicels; rhachilla not produced beyond the palea. Glumes 3, usually membranous, 1-nerved or nerveless; invol.-glumes empty, unequal, separately caducous; floral glume not articulate at the base, ovate or oblong, obtuse or acute; callus very short, glabrous; palea as long as the glume and of similar texture, broadly oblong, often dorsally narrowly inflexed along the median line, with a nerve-like ventral ridge along which the palea splits between the two very close often very obscure nerves. Lodicules very minute or 0. Stamens 2–3; anthers short or long. Styles 2, free; stigmas very short. Grain oblong, obovoid or pyriform, free within the glume and palea, with a loose hyaline pericarp.—DISTRIB. Species about 70, in tropical and subtropical regions of both hemispheres.

Invol.-glumes both shorter than the floral glume.
- Stamens 2.
  - Stems 1–3 ft. high; panicle reaching 10 in. long; spikelets $\frac{1}{20}$–$\frac{1}{18}$ in. long ..... 1. *S. diander.*
  - Whole plant scarcely 6 in. high; panicle $\frac{3}{4}$–1 in. long; spikelets $\frac{1}{16}$–$\frac{1}{12}$ in. long ..... 2. *S. sindicus.*
- Stamens 3.
  - Panicle narrow, $\frac{1}{2}$–$\frac{3}{4}$ in. broad; spikelets reaching $\frac{1}{16}$ in. long ..... 3. *S. indicus.*
  - Panicle reaching 3 in. broad.
    - Panicle 12–18 in. long; spikelets $\frac{1}{25}$ in. long ..... 4. *S. multiflorus.*
    - Panicle 4–6 in. long; spikelets $\frac{1}{12}$ in. long ..... 5. *S. ioclados.*
- Lower invol.-glume as long as the floral glume or nearly so; panicle interrupted ..... 6. *S. glaucifolius.*
- Lower invol.-glume much shorter than either of the two others; upper invol.-glume as long as or longer than the floral glume.
  - Panicle contracted.
    - Annual; upper invol.-glume longer than the floral glume ..... 7. *S. piliferus.*
    - Perennial; upper invol.-glume about equalling the floral glume ..... 8. *S. orientalis.*
  - Panicle effuse.
    - Spikelets $\frac{1}{16}$ in. long ..... 9. *S. arabicus.*
    - Spikelets $\frac{1}{20}$ in. long ..... 10. *S. coromandellianus.*

1. **Sporobolus diander,** *Beauv. Agrost.* (1812) p. 26. Annual or perennial; stems tufted, 1–3 ft. high, slender, smooth; nodes glabrous. Leaves 4–10 by $\frac{1}{25}$–$\frac{1}{16}$ in., with filiform tips, flat or convolute, smooth,

strongly nerved; sheaths smooth, ribbed, the lower short, the upper very long; ligule a very narrow ridge of minute hairs. Panicle reaching 10 by 2 in., erect, narrowly pyramidal; rhachis slender, quite smooth; branches capillary, erect or spreading, naked at the base, $\frac{1}{4}$–2 in. long, with numerous very minute spikelets racemosely arranged along the branchlets. Spikelets $\frac{1}{20}$–$\frac{1}{18}$ in. long; pedicels very short. Glumes 3; lower invol.-glume very short, scarcely $\frac{1}{50}$ in. long, broadly oblong, nerveless, hyaline, with erose tip; upper invol.-glume about $\frac{1}{30}$ in. long, broadly elliptic-oblong, hyaline, obscurely 1-nerved; floral glume $\frac{1}{20}$–$\frac{1}{18}$ in. long, broadly ovate-oblong, subacute, 1-nerved; palea plicate in the median line. Stamens 2. Grain obovoid, truncate, obtusely quadrangular, umbonate by the loose pericarp, red-brown, rugulose. Fl. B. I. v. 7, p. 247; Dalz. & Gibs. p. 296; Trim. Fl. Ceyl. v. 5, p. 260; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Prain, Beng. Pl. p. 1213; Watt, Dict. Econ. Prod. v. 6, part 3, p. 341.

DECCAN: Poona, *Jacquemont*, 352!—DISTRIB. Throughout India; Ceylon, Asia, Tropical Australia.

2. **Sporobolus sindicus,** *Stapf, MS. in Herb. Kew.* A low perennial 4–5 in. high; roots stout, wiry; stems densely tufted, the barren ones subwoody, $\frac{1}{12}$ in. in diam., clothed below with numerous withered leaf-sheaths, the flowering stems lateral from the barren ones, slender. Leaves pungent, those of the barren stems crowded, short, ovate-lanceolate to narrowly lanceolate, $\frac{1}{4}$–$\frac{1}{2}$ in. long, with spinous margins, those of the flowering stems narrowly linear, acuminate, distant, often with distantly spinous margins; sheaths closely appressed to the stem, ribbed; ligule a very narrow ciliate membrane. Panicle $\frac{3}{4}$–1 in. long, contracted, often spike-like; branches erect or ascending, filiform, densely clothed with spikelets. Spikelets $\frac{1}{16}$–$\frac{1}{12}$ in. long, ovoid, acute; pedicels short. Glumes 3, hyaline; lower invol.-glume $\frac{1}{25}$ in. long, ovate, acute, nerveless; upper invol.-glume $\frac{1}{20}$ in. long, oblong, obtuse, nerveless; floral glume $\frac{1}{16}$ in. long, ovate, obtuse (acute when folded), 1-nerved; palea shorter than the glume, oblong, truncate. Stamens 2. Grain $\frac{1}{30}$ in. long, broadly obovoid, compressed, reddish-brown.—Flowers: Nov.

SIND: 20 miles from Karachi, *Woodrow!* There is but one sheet of this plant in Herb. Kew., collected by Woodrow.

3. **Sporobolus indicus,** *Br. Prodr.* (1810) p. 170. Perennial; stems 2–3 ft. high, densely tufted, stout; internodes long; nodes glabrous. Leaves mostly crowded near the base, 1–2 ft. long, very slender, wiry, flexuous, convolute (rarely flat), with long filiform tips, quite smooth; sheaths smooth, ribbed; ligule a ridge of minute hairs. Panicles 1–1½ ft. long by ½–¾ in. broad, often interrupted; rhachis slender, smooth; branches very short, densely crowded, erect, covered to the base with imbricate green spikelets. Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long; pedicels very short. Glumes 3; lower invol.-glume about $\frac{1}{50}$ in. long, broadly oblong, nerveless, hyaline; upper invol.-glume $\frac{1}{25}$ in. long, broadly oblong, hyaline, nerveless; floral glume $\frac{1}{12}$–$\frac{1}{10}$ in. long, broadly ovate, 1-nerved; palea plicate in the median line. Stamens 3. Grain $\frac{1}{20}$ in. long, obovoid, quadrangular, truncate, umbonate by the loose pericarp, red-brown, rugulose. Fl. B. I. v. 7, p. 247; Trim. Fl. Ceyl. v. 5,

p. 261; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Prain, Beng. Pl. p. 1213; Watt, Dict. Econ. Prod. v. 6, part 3, p. 341.—Flowers: Oct.

DECCAN: Kolhapur, *Woodrow*.—DISTRIB. Throughout India; Ceylon, most warm countries.

4. **Sporobolus minutiflorus,** *Link, Hort. Reg. Berol.* v. 1 (1827) p. 88. Stem 2–3 ft. high, slender, smooth; nodes glabrous. Leaves 6–10 by $\frac{1}{12}$–$\frac{1}{8}$ in., flat, finely acuminate, with smooth margins; sheaths long, ribbed, smooth; ligule a minute ring. Panicle 12–18 in. long, reaching 3 in. broad, effuse, supra-decompound; branches capillary. Spikelets $\frac{1}{25}$ in. long, dark-colored. Glumes 3; lower invol.-glume about $\frac{1}{60}$ in. long, subquadrate; upper invol.-glume $\frac{1}{50}$ in. long, broadly ovate, subobtuse, nerveless; floral glume $\frac{1}{25}$ in. long, ovate-oblong, subobtuse, nerveless; palea shorter, broad, truncate. Stamens 3, quickly falling with age. Grain $\frac{1}{30}$ in long, obovoid, compressed. Fl. B. I. v. 7, p. 248; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Oct.

KONKAN: Parel (Bombay), *Woodrow*!—DISTRIB. India (W. Peninsula).

5. **Sporobolus ioclados,** *Nees, Fl. Afr. Austr.* (1841) p. 161. An elegant perennial grass; stems 10–18 in. long, densely tufted, rather stout, erect, smooth, glabrous; nodes glabrous. Leaves 2–4 by $\frac{1}{10}$–$\frac{1}{8}$ in., flat or convolute, linear, tapering to a fine point; sheaths ribbed, glabrous, smooth; ligule a pubescent ridge. Panicle 4–6 by 2–3 in., ovate or subpyramidal, effuse; branches opposite, or alternate, or the lower whorled, spreading, remotely branched, filiform, smooth. Spikelets $\frac{1}{12}$ in. long, oblong-lanceolate, pale. Glumes 3; lower invol.-glume $\frac{1}{30}$ in. long, oblong-lanceolate, hyaline; upper invol.-glume $\frac{1}{18}$ in. long, ovate, acute, 1-nerved; floral glume $\frac{1}{12}$ in. long, ovate-lanceolate, acute, 1-nerved; palea slightly shorter than the glume, oblong, obtuse. Stamens 3, anthers $\frac{1}{30}$ in. long. Grain linear-oblong, $\frac{1}{30}$ in. long. Fl. B. I. v. 7, p. 249; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.

SIND: *Stocks*!—DISTRIB. S. Africa.

6. **Sporobolus glaucifolius,** *Hochst. in Flora*, v. 25, part 1 (1842) *Beibl.* p. 133 (*nomen nudum*), et ex *Steud. Syn. Pl. Gram.* (1855) p. 154 (under *Vilfa*). Perennial; stems 12–18 in. long, densely tufted, leafy; nodes glabrous. Leaves 1½–5 by $\frac{1}{10}$–$\frac{1}{8}$ in., narrowed from a subcordate base to an acuminate tip, strict, glaucous, flat or undulate, not pungent; sheaths ribbed, glabrous; ligule a line of hairs. Panicle 3–5 in. long, contracted, interrupted, pale yellowish-white; branches short, erect. Spikelets crowded, $\frac{1}{12}$ in. long; pedicels very short. Glumes 3; lower invol.-glume $\frac{1}{16}$ in. long, lanceolate, hyaline, acutely acuminate, 1-nerved; upper invol.-glume $\frac{1}{12}$ in. long, broader than the lower, ovate-lanceolate, acutely acuminate, hyaline, 1-nerved; floral glume $\frac{1}{16}$ in. long, ovate, acute, 1-nerved; palea as long as the glume. Stamens 3; filaments very short; anthers $\frac{1}{30}$ in. long. Fl. B. I. v. 7, p. 250; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.—Flowers: Nov.

Dalzell without locality in Herb. Kew.! SIND: *Stocks*, 666!; Karachi, *Woodrow*, 18!—DISTRIB. India (Panjáb, W. Peninsula); Tropical Africa.

7. **Sporobolus piliferus,** *Kunth, Enum. Pl.* v. 1 (1833) p. 211 (var. *a*). Annual; stems 3–12 in. high, tufted, erect; roots fibrous. Leaves 1–4 by $\frac{1}{16}$–$\frac{1}{10}$ in., chiefly radical, narrowed from the base to a fine point, flat or convolute, with scabrid or subserrulate margins; sheaths hairy at the mouth; ligule a minute narrow line. Panicle linear, 1–3 in. long, strict, erect, dense-flowered, often interrupted; branches very short, erect. Spikelets $\frac{1}{16}$–$\frac{1}{12}$ in. long, pale brown; pedicels short. Glumes 3; lower invol.-glume $\frac{1}{20}$ in. long, ovate-lanceolate, hyaline, nerveless; upper invol.-glume $\frac{1}{12}$ in. long, oblong-lanceolate, 1-nerved, slightly longer than the floral glume; floral glume $\frac{1}{16}$ in. long, oblong, obtuse, 1-nerved; palea oblong. Stamens 2. Grain ellipsoid, compressed, with a very loose pericarp, reddish-brown. Fl. B. I. v. 7, p. 251; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439.

S. M. COUNTRY: Belgaum, *Ritchie*, 836!—DISTRIB. India (W. Himalaya, Khasia Hills, Nilghiri Hills, W. Peninsula); Malacca.

8. **Sporobolus orientalis,** *Kunth, Enum. Pl.* v. 1 (1833) p. 211. Stoloniferous, growing on saline soils; stolons stout or slender, rooting at the nodes; stems 6–18 in. high, stout at the base, hard, branching; branches and flowering stems usually geniculate below. Leaves coriaceous, variable, 1–8 by $\frac{1}{10}$–$\frac{1}{6}$ in., usually more or less pungent, tapering to the tip, glabrous or hairy above and with scabrous or subserrulate margins; sheaths close, glabrous; ligule a slender ciliate membrane. Panicle narrow, oblong; branches $\frac{1}{2}$–$\frac{3}{4}$ in. long, suberect. Spikelets $\frac{1}{10}$ in. long. Glumes 3, hyaline; lower invol.-glume $\frac{1}{35}$ in. long, ovate-oblong, obtuse, nerveless; upper invol.-glume $\frac{1}{10}$ in. long, ovate, subobtuse, 1-nerved; floral glume ovate-oblong, obtuse, scarcely longer than the upper invol.-glume, 1-nerved; palea ovate-oblong, obtuse, slightly shorter than the glume. Fl. B. I. v. 7, p. 251; Dalz. & Gibs. p. 295; Trim. Fl. Ceyl. v. 5, p. 263; Duthie, Fodd. Grass. N. Ind. p. 49; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 439; Watt, Dict. Econ. Prod. v. 6, part 3, p. 341.—Flowers: Nov.

GUJARAT: Umrat, on salt land, *Woodrow*.—DISTRIB. India (Panjáb, W. Peninsula); Ceylon.

9. **Sporobolus arabicus,** *Boiss. Diagn.* ser. 1, fasc. 13 (1853) p. 47. Perennial; stems many from a woody stoloniferous base, sometimes as thick as the middle finger, and sending out rigid often geniculate stolons and stout or slender flowering branches 6–24 in. high. Leaves 1–10 by $\frac{1}{8}$–$\frac{1}{6}$ in., rigid, narrowed to the tip from the rounded base, flat or convolute, scaberulous above, with finely ciliato-serrulate margins; sheaths glabrous; ligule a fringe of hairs. Panicle 2–6 in. long, effuse; branches whorled, capillary, reaching $1\frac{1}{2}$ in. long, naked below, with spikelets spicately arranged on the short branchlets. Spikelets $\frac{1}{10}$ in. long; pedicels short. Glumes 3; lower invol.-glume $\frac{1}{30}$ in. long, ovate, subobtuse, hyaline, nerveless; upper invol.-glume $\frac{1}{10}$ in. long, oblong, obtuse, 1-nerved; floral glume as long as the upper invol.-glume, oblong, obtuse, 1-nerved; palea as long as the glume. Grain subglobose. Fl. B. I. v. 7, p. 252; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440.

SIND: *Stocks*, 667!; Jemadar ka Landa near Karachi, *Stocks*, 663!; Karachi, *Woodrow*; between Karachi and Magar-Peer, *Wykeham Perry*!—DISTRIB. India (Panjáb); Beluchistan, Arabia.

10. **Sporobolus coromandellianus,** *Link, Hort. Reg. Berol.* v. 1 (1827) p. 89 (*in note*); *Kunth, Revis. Gram.* v. 1 (1829) p. 68. Annual, densely tufted; stems 4–12 in. long, erect, ascending or often spreading from the root, copiously leafy at the base. Leaves 1–3 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear-lanceolate, narrowed from the subcordate base to the acuminate tip, spinulosely toothed especially towards the base; lower sheaths short, terete or compressed, the upper long, hairy at the mouth; ligule a narrow membrane fringed with long fine hairs. Panicle 2–4 by 1–$2\frac{1}{2}$ in., ovate or pyramidal; branches capillary in rather distant whorls of 3–6, horizontally spreading, naked below, sparingly shortly divided upwards, bearing short minute red spikelets about $\frac{1}{20}$ in. long on short pedicels. Glumes 3, hyaline; lower invol.-glume very minute, suborbicular, nerveless; upper invol.-glume $\frac{1}{20}$ in. long, ovate-oblong, subacute, 1-nerved; floral glume as long, oblong, obtuse, 1-nerved; palea as long as the glume. Stamens 3; anthers small. Grain broadly ellipsoid, compressed, smooth, enclosed in the loose somewhat fleshy reticulate pericarp, pale reddish-brown. Fl. B. I. v. 7, p. 252; Dalz. & Gibs. p. 296; Trim. Fl. Ceyl. v. 5, p. 264; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1213. *Agrostis coromandelliana*, Retz. Obs. fasc. 4 (1786) p. 19; Grah. Cat. p. 235.—Flowers: Jan.

KONKAN: Bombay, *Law!* SIND: Jemadar ka Landa near Karachi, *Stocks!*—DISTRIB. India (Panjáb, Orissa, Birma, W. Peninsula); Ceylon, Africa, Afghanistan.

51. **ERAGROSTIS,** Beauv.

Annual usually slender glabrous grasses of various habit; stems erect or ascending. Leaves narrow; ligule usually reduced to a line of hairs. Spikelets 2–many-flowered, in open or contracted panicles (rarely spicate), strongly laterally compressed, ovate-oblong or linear, not (or rarely) articulate on their pedicels on a simple terminal rhachis; rhachilla disarticulating above the invol.-glumes and between the floral ones, or tough and persistent, not produced beyond the upper floret. Glumes many, broad, obtuse, acute or mucronate, never awned, thin, dorsally rounded and keeled; invol.-glumes much shorter than the spikelet, equal or unequal, empty, persistent or separately deciduous, 1 (rarely 3)-nerved, usually membranous; floral glumes imbricating, at length deciduous from the rhachilla, 3-nerved, all 2-sexual or the uppermost and rarely the lowest imperfect, ovate to lanceolate, membranous to chartaceous, usually glabrous, the lateral nerves short, not reaching the midnerve; paleæ equal to their glumes or slightly shorter, membranous, 2-keeled, deciduous or persistent on the rhachilla. Lodicules 2, small, cuneate, more or less fleshy. Stamens 3 (rarely 2). Styles distinct; stigmas plumose, laterally exserted. Grain minute, globose, oblong, ovoid or obovoid, free in the glume and palea.—DISTRIB. In warm countries; species about 100.

Spikelets panicled.
- Rhachilla of spikelets more or less jointed and breaking up from above downwards.
  - Panicle spiciform, compact, 2–3 by $\frac{1}{2}$ in.; rhachis bearded at the nodes; margins of flowering glumes ciliate ..... 1. *E. ciliata.*
  - Panicle open or more or less contracted; margins of flowering glumes not ciliate.
    - Spikelets $\frac{1}{8}$ in. long; panicle large, lax, thyrsiform, 8–20 by 4–6 in. ..... 2. *E. aspera.*

Spikelets $\frac{1}{10}$ in. long; panicle short, compact, cylindric, $\frac{1}{2}$–$1\frac{1}{2}$ in. long ..... 3. *E. ciliaris* var. *brachystachya.*

Spikelets $\frac{1}{20}$–$\frac{1}{8}$ in. long; panicles 2–8 in. long.
Grain ovoid; stamens 3.
Stem and rhachis of panicle not viscid below.
Panicle open; nodes bearded ..... 4. *E. tenella* var. *plumosa.*
Panicle very narrow, contracted; rhachis glabrous ..... var. *riparia.*
Stem and rhachis of panicle viscid below ..... var. *viscosa.*
Grain obovoid; stamens 2; panicle narrow, often interrupted, 6–18 in. long ..... 5. *E. interrupta* var. *Kœnigii.*

Rhachilla of spikelets tough, persistent; flowering glumes falling away from its base upwards.
Spiklets pedicellate.
Spikelets flat, ovate-elliptic or oblong; lateral nerves of flowering glumes very prominent, straight, almost percurrent; paleæ deciduous with their glumes ..... 6. *E. amabilis.*
Spikelets less compressed, linear or linear-oblong; lateral nerves less prominent; when spikelets compressed or lateral nerves prominent, then with persistent paleæ.
Spikelets more or less fascicled on the primary or secondary branches or shortly pedicellate in narrow racemes.
Leaves glaucous; grain oblong ..... 7. *E. gangetica.*
Leaves not glaucous; grain globose or nearly so ..... 8. *E. stenophylla.*
Spikelets not fascicled; long-pedicellate, more or less divaricate when ripe.
Leaf-margins glandular.
Lower invol.-glume 1–3-nerved; upper invol.-glume 3-nerved .... 9. *E. major.*
Both invol.-glumes 1-nerved ..... 10. *E. minor.*
Leaf-margins eglandular; invol.-glumes 1-nerved.
Spikelets versatile, 1 in. or more long, narrowly linear; branches of panicle solitary ..... 11. *E. tremula.*
Spikelets small, $\frac{1}{4}$ in. long or less.
Perennial; mouth of leaf-sheath naked; branches of panicle solitary or 2-nate. 12. *E. tenuifolia.*
Annual; mouth of leaf-sheath bearded; branches of panicle usually more or less whorled ..... 13. *E. pilosa.*
Spikelets sessile and jointed on the very short densely crowded branchlets of a tall narrow raceme-like panicle, deciduous, acute, much compressed, imbricate and secund ..... 14. *E. cynosuroides.*
Spikelets distichously spreading, secund, in a long simple terminal spike; keels of palea winged ..... 15. *E. bifaria.*

1. **Eragrostis ciliata,** *Nees, Agrost. Bras.* (1829) p. 512, Obs. 1 (*nomen nudum*). Perennial; stems 1–$2\frac{1}{2}$ ft. long, erect or geniculately ascending, terete. Leaves linear-lanceolate, finely acuminate, spreading, 2–6 by $\frac{1}{10}$–$\frac{1}{6}$ in., flat or convolute, smooth, glabrous; sheaths bearded at the mouth; ligule of a few hairs. Panicle spiciform, 2–3 by $\frac{1}{3}$ in., cylindric, compact; branches much shortened; rhachis finely bearded at the nodes. Spikelets $\frac{1}{10}$–$\frac{1}{6}$ in. long, much compressed, 6–12-flowered. Invol.-glumes ovate, acute, hyaline, ciliate; floral glumes $\frac{1}{16}$–$\frac{1}{8}$ in. long,

broadly ovate, cuspidately acuminate, subhyaline, very minutely scaberulous, the margins ciliate and the nerves prominent; palea shorter than its glume with ciliate keels. Grain ovoid to ellipsoid, $\frac{1}{50}$ in. long, terete. Fl. B. I. v. 7, p. 313; Dalz. & Gibs. p. 298; Prain, Beng. Pl. p. 1220. *Poa ciliata*, Roxb. Fl. Ind. ed. Wallich, v. 1 (1820) p. 336.

GUJARAT: Domas near Surat, *Dalzell & Gibson*.

This plant has been included on the authority of Dalzell & Gibson in their 'Bombay Flora.' I have seen no specimens from Bombay, nor does Woodrow include the plant in his list in the 'Bombay Journal of Natural History.' Dalzell's description of the plant is accurate.—DISTRIB. India (Chota Nagpur, W. Peninsula); Cochinchina.

2. **Eragrostis aspera,** *Nees, Fl. Afr. Austr.* (1841) p. 408. Annual; stems 8–20 in. high (excluding the panicle), stout, suberect, usually tufted, smooth and shining; nodes glabrous. Leaves 8–18 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear, flat, glabrous; sheaths bearded at the mouth, otherwise glabrous; ligule a fringe of long hairs. Panicle lax, open, thyrsiform, oblong to obovate-oblong, 8–20 by 4–6 in.; rhachis terete, scaberulous, bearded at the nodes; branches solitary or falsely whorled, capillary, loosely and repeatedly divided from near the base; pedicels longer than the spikelets, very slender. Pedicels scattered, linear-oblong, $\frac{1}{5}$ by $\frac{1}{25}$ in., erect, 4–16-flowered; rhachilla very slender, breaking up. Invol.-glumes subequal, oblong, obtuse, $\frac{1}{25}$ in. long, 1-nerved; floral glumes about $\frac{1}{16}$ in. long, obliquely ovate-oblong, with prominent nerves; palea obscurely and obtusely 3-lobed, the keels scabrid. Stamens 3; anthers $\frac{1}{50}$ in. long. Grain subglobose, about $\frac{1}{60}$ in. in diam. Fl. B. I. v. 7, p. 314; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 386; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441.

KONKAN: *Lisboa*! KANARA: N. Kanara, *Lisboa*!—DISTRIB. India (S. India, W. Peninsula); Ceylon, Tropical and S. Africa, Isle of France.

3. **Eragrostis ciliaris,** *Link, Hort. Reg. Berol.* v. 1 (1827) p. 192. VAR. **brachystachya,** *Boiss. Fl. Orient.* v. 5 (1881) p. 582. Stems 6–10 in. long, tufted, geniculately ascending, glabrous, smooth. Leaves 2–3 by $\frac{1}{20}$–$\frac{1}{12}$ in., linear, tapering to a fine point; sheaths striate, usually bearded at the mouth with long hairs; ligule a fringe of short hairs. Panicle short, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, oblong, cylindric, appearing hairy from the long cilia of the paleæ; branches short, suberect. Spikelets $\frac{1}{10}$ in. long, crowded, 6–12-flowered, strongly compressed; rhachilla breaking up; pedicels very short. Invol.-glumes subequal, ovate-lanceolate, acute, reaching $\frac{1}{16}$ in. long; floral glumes $\frac{1}{20}$ in. long, oblong, subtruncate, mucronulate, spreading; paleæ equal to their glumes and falling with them, the keels with long rigid cilia. Stamens 3; anthers very short. Grain elongate-ovoid, about $\frac{1}{50}$ in. long. Fl. B. I. v. 7, p. 314; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441.—Flowers: Nov.

Dalzell without locality in Herb. Kew.! GUJARAT: Baroda, *Woodrow*. SIND: *Stocks*!; Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (Upper Gangetic plain, W. Peninsula); Arabia, Tropical Africa.

4. **Eragrostis tenella,** *Roem. & Schult. Syst.* v. 2 (1817) p. 576. A very variable annual with slender densely tufted stems, of which the following varieties are found or said to be found in the Bombay Presidency.

VAR. 1. *plumosa*, Stapf, in Hook. f. Fl. B. I. v. 7 (1896) p. 315. Stems tufted, sometimes reaching 15 in. high or more, and as well as the panicle eglandular. Panicle delicate, open, often flexuous; rhachis bearded at the nodes; pedicels distinct, often long. Spikelets 3–9-flowered, $\frac{1}{20}$–$\frac{1}{6}$ in. long. Invol.-glumes unequal, the lower distinctly shorter than the upper; floral glumes $\frac{1}{30}$ in. long; keels of the palea pectinately ciliate with long hairs; anthers minute. Grain ovoid, about $\frac{1}{60}$ in. long. Trim. Fl. Ceyl. v. 5, p. 291; Prain, Beng. Pl. p. 1220. *Eragrostis plumosa* (sp.), Link, Hort. Reg. Berol. v. 1 (1827) p. 192 (*not* of Boiss.); Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 385; Watt, Dict. Econ. Prod. v. 3, p. 255. *E. tenella*, Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441.—Flowers: Nov. VERN. *Woya*; *Bakrálu*.

KONKAN: common, *Lisboa*. DECCAN: Poona, *Cooke!*, *Woodrow*. GUJARAT: Surat, *Woodrow*.—DISTRIB. Throughout India; Ceylon.

VAR. 2. *riparia*, Stapf, in Hook. f. Fl. B. I. v. 7 (1896) p. 315. Stems and panicle eglandular. Panicle delicate, contracted, very narrow, flaccid, 1–3 by $\frac{1}{6}$–$\frac{1}{3}$ in., subcylindric; rhachis glabrous; branches very short, erect, smooth, glabrous. Spikelets crowded. Invol.-glumes unequal, the lower $\frac{1}{3}$ shorter than the upper; floral glumes $\frac{1}{25}$ in. long. Anthers about $\frac{1}{100}$ in. long. Grain $\frac{1}{60}$ in. long, ovoid. Prain, Beng. Pl. p. 1220. *Eragrostis riparia* (sp.), Steud. Syn. Gram. (1855) p. 265. *Poa tenella*, Roxb. Fl. Ind. v. 1 (1832) p. 337; Grah. Cat. p. 236. This has been included on the authority of Graham (*l. c.*), who, however, gives no habitat. I have seen no specimens from the Bombay Presidency.

VAR. 3. *viscosa*, Stapf, in Hook. f. Fl. B. I. v. 7 (1896) p. 315. Stems and rhachis of the panicle more or less viscid. Panicle stiff, stouter and with firmer and more strongly nerved glumes than in vars. *plumosa* and *riparia*, oblong to linear, 2–3 by $\frac{1}{2}$–1 in.; branches spreading, filiform, often very short; rhachis usually glabrous (rarely obscurely bearded at the nodes). Spikelets 5–20-flowered, often purplish. Invol.-glumes nearly equal or the lower very slightly shorter than the upper; floral glumes $\frac{1}{25}$–$\frac{1}{16}$ in. long. Anthers about $\frac{1}{100}$ in. long. Grain ovoid, $\frac{1}{80}$–$\frac{1}{50}$ in. long. Trim. Fl. Ceyl. v. 5, p. 291; Prain, Beng. Pl. p. 1220. *Eragrostis viscosa*, Trin. in Mém. Acad. Pétersb. sér. 6, v. 1 (1831) p. 397; Dalz. & Gibs. p. 298; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 386. *Poa viscosa*, Retz. Obs. fasc. 4 (1786) p. 20; Roxb. Fl. Ind. v. 1 (1832) p. 336; Grah. Cat. p. 236.

KONKAN: Malabar Hill (Bombay), *Graham, Dalzell & Gibson, Lisboa*; Chowpatti (Bombay), *Lisboa*. The viscid substance on the plant has a balsamic odor (*Dalzell & Gibson*).—DISTRIB. India (southern districts); Ceylon, Tropical and S. Africa.

5. **Eragrostis interrupta,** *Beauv. Agrost.* (1812) p. 71 (*not* of Roem. & Schult. nor of Trin.). VAR. **Kœnigii,** *Stapf, in Hook. f. Fl. B. I.* v. 7 (1896) p. 316. A tall glabrous annual or perennial grass; stem erect, 1–3 ft. high or more, smooth and polished; nodes glabrous. Leaves 3–10 in. long, narrow, flat; sheaths glabrous, close; ligule a fimbriate membrane. Panicle erect, 6–18 in. long, contracted; branches filiform, often distant, 2 or more proceeding from the same level and giving the panicle a verticillate appearance. Spikelets small, $\frac{1}{12}$–$\frac{1}{8}$ in. long, usually 6–14-flowered, smooth, often tinged with red, pedicellate; rhachilla articulate between the flowering glumes, glabrous, disarticulating from above downwards. Invol.-glumes subequal, about $\frac{1}{30}$ in.

long, ovate-oblong, obtuse, hyaline, 1-nerved; floral glumes about $\frac{1}{30}$ in. long, ovate-oblong, obtuse; palea linear-oblong, with smooth or slightly scaberulous keels. Stamens 2; anthers small. Grain obovoid. Trim. Fl. Ceyl. v. 5, p. 292; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1220. *Eragrostis Kœnigii*, Link, Hort. Reg. Bot. Berol. v. 2 (1833) p. 294 in syn. *Eragrostis nutans*, Nees, ex Wight, Cat. (1833) n. 1776, et ex Steud. Nom. ed. 2, part 1 (1840) p. 563; Dalz. & Gibs. p. 297; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 381; Watt, Dict. Econ. Prod. v. 3, p. 255.—Flowers: Nov. VERN. *Chiksi.*

KONKAN: Bassein, *Lisboa*; Thána, *Lisboa*. DECCAN: Bhowdan near Poona, *Woodrow*. GUJARAT: in water-holes, *Dalzell & Gibson*; Surat, *Cooke*!, *Woodrow*.—DISTRIB. Throughout India; Ceylon, Tropical Asia and Africa.

6. **Eragrostis amabilis,** *Wight & Arn. ex Nees, in Hook. & Arn. Bot. Beech. Voy.* (1841) p. 251 (*not* of Linn.). Annual, glabrous; stems 6–18 in. long, tufted, slender, erect or geniculately ascending, leafy chiefly at the base; internodes long. Leaves 3–6 by $\frac{1}{10}$–$\frac{1}{6}$ in., narrowed from a broad subcordate base to an acute tip, smooth; sheaths smooth, glabrous; ligule 0 or obscure. Panicle oblong or ovoid, 2–4 in. long, sparingly branched; rhachis and nodes glabrous. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ in. long, compressed, ovoid-elliptic or oblong, 20–50-flowered, shortly pedicellate, often purple; rhachilla tough, internodes very short. Glumes elegantly distichous, spreading, keeled; involucral glumes subequal or the upper slightly longer than the lower, $\frac{1}{25}$–$\frac{1}{16}$ in. long, ovate, acute, 1-nerved; floral glumes broadly ovate or suborbicular, mucronulate, $\frac{1}{12}$ in. long, punctulate; palea shorter than its glume and deciduous with it. Stamens 3; anthers minute. Grain obovoid or ellipsoid, laterally compressed, about $\frac{1}{30}$ in. long, orange-brown, smooth. Fl. B. I. v. 7, p. 317; Trim. Fl. Ceyl. v. 5, p. 293; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1220. *Eragrostis unioloides*, Nees, ex Steud. Syn. Gram. (1855) p. 264; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 383. *Poa unioloides*, Retz. Obs. fasc. 5 (1789) p. 19; Roxb. Fl. Ind. v. 1, p. 339; Grah. Cat. p. 236. *Uniola indica*, Spreng. Syst. v. 1 (1825) p. 349; Dalz. & Gibs. p. 298.—Flowers: Sept.–Nov.

KONKAN: Parel (Bombay); Bassein, *Woodrow*. DECCAN: Poona, *Woodrow*; Lanoli, *Woodrow*, 165! S. M. COUNTRY: marshes N. of Belgaum, *Ritchie*, 846!—DISTRIB. Throughout India; Ceylon, Tropical Asia.

7. **Eragrostis gangetica,** *Steud. Syn. Gram.* (1855) p. 266. Perennial; stems tufted, 1–3 ft. long, stout, smooth, shining, simple or branched, suberect. Leaves few, 2–8 in. long, very narrow, convolute, rigid, quite smooth, glaucous, linear, tapering to a fine point; sheaths glabrous except the mouth which is sometimes bearded; ligule a minutely ciliolate rim. Panicle oblong, 2–6 in. long, nodding; branches solitary, rather distant, often long, suberect or the lower spreading; rhachis glabrous; pedicels of spikelets short. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear to linear-oblong, 10–30-flowered; rhachilla tough, glabrous, persistent, the internodes short. Lower involucral glume $\frac{1}{16}$ in. long, ovate-oblong, acute, 1-nerved; upper slightly larger, 1-nerved; floral glumes broadly ovate, subacute, reaching to nearly $\frac{1}{10}$ in. long; palea deciduous, slightly shorter than its glume, with scaberulous keels.

Stamens 3; anthers about $\frac{1}{25}$ in. long, yellow. Grain oblong, about $\frac{1}{32}$ in. long, brown. Trim. Fl. Ceyl. v. 5, p. 293; Stapf, in Dyer, Fl. Capen. v. 7 (1900) p. 617; Prain, Beng. Pl. p. 1221. *Eragrostis elegantula*, Stapf, in Hook. f. Fl. B. I. v. 7 (1896) p. 318 (*not* of Nees); Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441. *E. Brownei*, Nees, ex Wight, Cat. n. 1780; Watt, Dict. Econ. Prod. v. 3, p. 253.—Flowers: Dec.–Apr.

Deccan: Borkas, Máwal (Poona districts), *Woodrow.*—Distrib. Throughout India; Ceylon.

8. **Eragrostis stenophylla,** *Hochst. ex Miq. Analect. Bot. Ind.* part 2 (1851) p. 27. Perennial; stems densely tufted, 12–18 in. high, erect or geniculately ascending, simple or branched; upper internodes long. Leaves 3–5 in. long, very narrow, strict, rather stiff, usually convolute, smooth, quite flat, glabrous, not glaucous; sheaths smooth; ligule a narrow membranous line. Panicle ovate, or oblong, or sublinear, suberect or nodding; branches rather distant, alternate, obliquely spreading when ripe, much divided upwards; rhachis slender, smooth; pedicels of spikelets filiform. Spikelets $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear-oblong, 20–30-flowered; rhachila zig-zag. Lower invol.-glume $\frac{1}{30}$ in. long, ovate-oblong, subacute; upper invol.-glume slightly longer, both hyaline, 1-nerved; floral glumes broadly ovate, subacute, about $\frac{1}{16}$ in. long, with smooth keels; palea linear-oblong, caducous with the glumes, the keels scabrid. Stamens 3; anthers minute. Grain globose or globosely ellipsoid, $\frac{1}{10}$ in. long, reddish-brown, smooth. Fl. B. I. v. 7, p. 318; Trim. Fl. Ceyl. v. 5, p. 294; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1221. *Eragrostis Brownei,* Nees, in Wight, Cat. (1833) n. 1780 (partly); Watt, Dict. Econ. Prod. v. 3, p. 253.

Konkan: Malwán, *Woodrow.* Deccan: Borkas, Máwal (Poona districts), *Woodrow.* —Distrib. More or less throughout India; Ceylon, Tropical Asia and Africa.

9. **Eragrostis major,** *Host, Gram. Austr.* v. 4 (1809) p. 14, t. 24. Annual; stems 1–3 ft. high, usually stout and branched, leafy, erect or geniculately ascending, smooth, polished. Leaves reaching 8 by $\frac{1}{3}$ in., narrowed to a fine point, flat, smooth, flaccid, glandular along the margins; sheaths sparingly bearded; ligule a ciliolate ridge. Panicle 2–8 in. long, erect, oblong or ovate-oblong, open or sometimes contracted, usually stiff; rhachis strict, rather stout, smooth; branches spreading or suberect, capillary, stiff or flexuous, again branching from near the base, the branchlets short, capillary. Spikelets longer than their pedicels, usually crowded, ovate and $\frac{1}{6}$–$\frac{1}{4}$ in. long with 6–8 glumes, to linear-oblong rather narrowed upwards, and $\frac{1}{3}$–$\frac{1}{2}$ in. long or more with many (up to 60) glumes, olive-grey or yellowish; rhachilla tough, zig-zag, the internodes short, smooth. Invol.-glumes ovate, acute, with scabrid keels; lower smaller than the upper, 1 (sometimes 3)-nerved; upper slightly larger than the lower, 3-nerved; floral glumes broadly ovate, acute, sometimes apiculate, $\frac{1}{12}$ in. long, strongly nerved; palea obovate, much curved, shorter than its glume, with ciliolate keels. Stamens 3; anthers $\frac{1}{60}$ in. long. Grain globose, $\frac{1}{40}$ in. in diam., microscopically rugulose, reddish-brown. Fl. B. I. v. 7, p. 320; Trim. Fl. Ceyl. v. 5, p. 297; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1221. *Eragrostis megastachya*, Link, Hort.

Reg. Berol. v. 1 (1827) p. 187; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 382; Watt, Dict. Econ. Prod. v. 3, p. 254.—Flowers: Nov.-Jan.

DECCAN: Poona, *Jacquemont*, 349!, *Woodrow*. S. M. COUNTRY: Badami, *Woodrow*! GUJARAT: Morvi (Kathiawar), *Woodrow*. SIND: *Woodrow*.—DISTRIB. More or less throughout India; Ceylon, westwards to S. Europe, tropical and subtropical Asia.

10. **Eragrostis minor,** *Host, Gram. Austr.* v. 4 (1809) p. 15 (*in note*) et in *Pl. Austriac.* v. 1 (1827) p. 135. Annual; stems 6–18 in. high, densely tufted, slender. Leaves 1½–6 by $\frac{1}{10}$–$\frac{1}{3}$ in., linear, acute, usually glandular along the margins, flat; sheaths shortly bearded at the mouth; ligule a pubescent ridge. Panicle oblong or ovate, rather stiff, 2–6 in. long; rhachis glabrous; branches spreading when mature. Spikelets linear to ovate, ¼ by $\frac{1}{20}$ in., up to 12-flowered, pale green to purplish- or olive-grey; pedicels shorter than the spikelets, except the terminal ones; rhachilla tough. Invol.-glumes subequal or the upper slightly larger, about $\frac{1}{20}$ in. long, ovate, acute, 1-nerved; floral glumes about $\frac{1}{16}$ in. long, ovate, acute, strongly nerved; palea obovate-oblong, about $\frac{1}{25}$ in. long, shorter than the persistent glumes, the keels scabrid or slightly ciliolate. Stamens 3; anthers about $\frac{1}{100}$ in. long. Grain $\frac{1}{50}$ in. long or more, dorsally rounded or slightly flattened. Fl. B. I. v. 7, p. 321; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1221.—Flowers: Nov.

Not very plentiful in the Bombay Presidency. KONKAN: Bombay, *Lambert*! DECCAN: Poona, *Jacquemont*, 350!; Nasik, *Lisboa*. GUJARAT: Godra, *Woodrow*; Panch Mahâls, *Woodrow*.—DISTRIB. More or less throughout India (plentiful in N. India); S. and Central Europe, N. Asia, N. Zealand, Philippines.

11. **Eragrostis tremula,** *Hochst. ex Steud. Syn. Gram.* (1855) p. 269. Annual; stems densely tufted, suberect, 6–24 in. long. Leaves 2–5 by $\frac{1}{12}$–$\frac{1}{6}$ in., linear-lanceolate, tapering to a fine point; sheaths bearded at the mouth; ligule a minutely hairy line. Panicle large, ovate, very diffuse; branches solitary, filiform; pedicels very slender, from ½ the length of the spikelets to longer than them; rhachis glabrous or bearded at the nodes. Spikelets 1 in. or more long, linear, narrower upwards, from 10–60-flowered. Invol.-glumes subequal, $\frac{1}{20}$–$\frac{1}{16}$ in. long, subobtuse, thin, 1-nerved; rhachilla tough, glabrous; floral glumes closely set, broadly ovate, subobtuse, $\frac{1}{16}$–$\frac{1}{12}$ in. long, with strong nerves; palea obovate-oblong, slightly shorter than its glume, persistent, with scabrid keels. Stamens 3; anthers minute. Grain scarcely $\frac{1}{50}$ in. in diam., globose or nearly so. Fl. B. I. v. 7, p. 320; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 382; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1221. *Eragrostis multiflora*, Trin. in Mém. Acad. Pétersb. sér. 6, v. 1 (1831) p. 401; Dalz. & Gibs. p. 298. *E. rhachitricha*, Hochst. ex Miq. Analect. Bot. Ind. part 2 (1851) p. 25; Watt, Dict. Econ. Prod. v. 3, p. 256.—Flowers: Nov.

DECCAN: Lanoli, *Lisboa*. GUJARAT: *Woodrow*; Gogo (Kathiawar), *Dalzell & Gibson*, *Woodrow*.—DISTRIB. India (Panjáb, Bengal, Birma, W. Peninsula); Afghanistan, Tropical Africa.

12. **Eragrostis tenuifolia,** *Hochst. in Flora*, v. 24, part 1 (1841), *Intelligenz.* p. 20 (*nomen nudum*). Perennial; stem 2–3 ft. high, erect, slender, branched. Leaves long, very narrow; mouth of sheath naked.

Panicle 3–6 in. long, oblong to ovate, very open; rhachis glabrous; branches solitary or 2-nate, distant. Spikelets $\frac{1}{4}$ in. long or less, linear, 5–15-flowered. Involucral-glumes very unequal; lower minute, hyaline; upper remote from and larger than the lower, about $\frac{1}{30}$ in. long, ovate, subacute, usually nerveless; floral glumes $\frac{1}{12}$ in. long, ovate, subacute or apiculate; palea shorter than its glume, strongly curved, persistent, with scabrid keels. Stamens 3; anthers $\frac{1}{25}$ in. long. Grain $\frac{1}{12}$ in. long, obovoid-oblong, slightly compressed, dorsally grooved. Fl. B. I. v. 7, p. 322; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1221.

S. M. Country: Belgaum, *Ritchie*!—Distrib. India (W. Peninsula); Tropical Africa.

13. **Eragrostis pilosa,** *Beauv. Agrost.* (1812) p. 71. Annual; stems 6–24 in. high, tufted, erect or geniculately ascending, slender, flaccid. Leaves usually short and narrow (rarely elongate), generally convolute; sheaths appressed, glabrous, bearded at the mouth; ligule a softly hairy ridge. Panicle 2–6 in. long, erect or inclined, oblong to pyramidal, open or contracted; rhachis glabrous or hairy, filiform; branches fascicled or whorled, capillary, much divided. Spikelets scattered (not fascicled), $\frac{1}{8}$–$\frac{1}{5}$ by $\frac{1}{30}$–$\frac{1}{20}$ in., linear, 5–12-flowered, often purplish; pedicels longer or shorter than the spikelets; rhachilla tough, smooth, flexuous. Glumes all hyaline; involucral-glumes very unequal; lower ovate, nerveless; upper much larger, ovate-lanceolate, acuminate, 1-nerved; floral glumes $\frac{1}{16}$–$\frac{1}{10}$ in. long; palea subpersistent, the keels scaberulous or nearly smooth. Grain ellipsoid, $\frac{1}{18}$–$\frac{1}{15}$ in. long, laterally apiculate at the base. Fl. B. I. v. 7, p. 323; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 381; Trim. Fl. Ceyl. v. 5, p. 296; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1221; Watt, Dict. Econ. Prod. v. 3, p. 255.

Deccan: Waghoti, Máwal (Poona districts), *Woodrow*, 9!; Poona, *Cooke*!; Nasik, *Lisboa*. S. M. Country: Dharwar, *Woodrow*. Sind: *Woodrow*.—Distrib. Throughout India; Ceylon, S. Europe and most warm countries.

14. **Eragrostis cynosuroides,** *Beauv. Agrost.* (1812) p. 71 & p. 162. Perennial, tall, branched from the base; rootstock stout, creeping; stolons very stout, covered with shining sheaths; stems 1–3 ft. high, tufted, smooth, erect, stout. Leaves many, the basal fascicled, reaching sometimes 20 in. long and $\frac{3}{8}$ in. broad at the base, rigid, acuminate, with filiform tips and hispid margins; sheaths glabrous; ligule a hairy line. Panicle 6–18 by $\frac{1}{2}$–$1\frac{1}{2}$ in., strict, erect, narrowly pyramidal or columnar, often interrupted; rhachis puberulous; branches many, short, scarcely reaching 1 in. long, crowded, clothed from the base with sessile imbricating spikelets. Spikelets sessile, secund, 2-seriate and crowded, deflexed, pale brown, rather shining, $\frac{1}{2}$ in. long, up to 30-flowered; rhachilla tough. Involucral-glumes very unequal; lower $\frac{1}{50}$ in. long; upper $\frac{1}{16}$ in. long, obtuse; floral glumes $\frac{1}{16}$–$\frac{1}{12}$ in. long, ovate, acute, coriaceous; palea shorter than its glume, subcoriaceous, with minutely scabrid keels. Stamens 3; anthers $\frac{1}{30}$ in. long. Grain $\frac{1}{50}$–$\frac{1}{40}$ in. long, obliquely ovoid, laterally compressed, obscurely 3-gonous. Fl. B. I. v. 7, p. 324; Dalz. & Gibs. p. 298; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 387; Woodr. in Journ. Bomb. Nat. v. 13 (1901)

p. 441 ; Prain, Beng. Pl. p. 1221; Watt, Dict. Econ. Prod. v. 3, p. 253. *Poa cynosuroides*, Retz. Obs. fasc. 4 (1786) p. 20 ; Grah. Cat. p. 236.—Flowers: Dec. VERN. *Darbha*; *Kusha*.

DECCAN: Nasik, *Lisboa*. GUJARAT: *Lisboa*; Mandvi (Kathiawar), *Woodrow*. SIND: Hyderabad, *Woodrow*.—DISTRIB. Throughout India in hot and dry places; Nubia, Egypt, Syria.

15. **Eragrostis bifaria,** *Wight, ex Steud. Nom.* ed. 2, part 1 (1840) p. 562. Perennial ; stems 1–3 ft. high, densely tufted, erect, simple, subcompressed, glabrous, clothed at the base with the soft fibres of old sheaths. Leaves 2–4 in. long, narrow, linear, acute, rigid, smooth; sheaths glabrous, keeled; ligule a pubescent line. Spikelets secund, distichously spreading in a long simple terminal spike 10–12 in. long. Spikelets ovoid to oblong, 15–20-flowered, $\frac{1}{4}$–$\frac{1}{3}$ in. long (rarely linear, reaching $\frac{2}{3}$ in. long and up to 40-flowered), laterally compressed, olive-grey or -green. Invol.-glumes strongly 1-nerved and keeled; lower invol.-glume $\frac{1}{6}$ in. long, acutely acuminate, with scaberulous keel; upper invol.-glume $\frac{1}{12}$ in. long, with stout rounded keel; floral glumes broadly ovate, subacute, $\frac{1}{8}$ in. long; palea slightly shorter than its glume, with winged keels, the wings $\frac{1}{100}$ in. wide, ciliolate. Stamens 3; anthers $\frac{1}{25}$ in. long. Fl. B. I. v. 7, p. 325; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 387; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441.—Flowers: Aug.

DECCAN: Khandala, *Woodrow*. S. M. COUNTRY: Belgaum, *Ritchie*.—DISTRIB. India (W. Peninsula); Tropical Africa.

52. **HALOPYRUM,** Stapf.

A tall stout perennial glabrous grass with a branching creeping sheathed rootstock. Leaves narrow, rigid, convolute. Spikelets large, many-flowered, sessile or shortly pedicellate on the short alternate branches of an elongate panicle, ovoid, strongly laterally compressed, not jointed on their pedicels, nor are the pedicels jointed on the branches; rhachilla articulate at the base and between the flowering glumes, silkily hairy. Glumes many, closely distichously imbricate, dorsally rounded, coriaceous, keeled; invol.-glumes subequal, ovate-lanceolate, acuminate or apiculate; lower invol.-glume 1–3-nerved; upper invol.-glume 5-nerved; floral glumes 6–10, rather shorter than the involucral, mucronulate, 3-nerved; palea as long as the glume, subacute, 2-keeled. Lodicules 2, obcordate. Stamens 3. Styles short, free; stigmas elongate. Grain ellipsoid, compressed, deeply hollowed anticously, free.—DISTRIB. Coasts of India and Ceylon, Arabia, Tropical Africa; species 1.

1. **Halopyrum mucronatum,** *Stapf, in Hook. Icon. Pl.* v. 25, t. 2448 (1896). Rootstock sending up hard woody stems 12–18 in. high and as thick as a crow-quill, smooth, shining, with strict vermiform roots, the branches often fascicled and clothed at the base with pale coriaceous shining mucronate sheaths. Leaves 8–12 by $\frac{1}{8}$–$\frac{1}{6}$ in., convolute (rarely flat), very narrow, glaucous, coriaceous, striate, quite smooth; sheaths terete, appressed, striate, hard, with villous mouth; ligule a few hairs. Panicle 12–16 in. long, erect or nodding; rhachis and branches quite smooth, angular, wiry. Spikelets $\frac{1}{2}$–$\frac{5}{8}$ in. long, flat,

sessile or shortly pedicellate, 10-15-flowered, smooth, white or pale yellowish; rhachilla very short, the hairs half as long as the glumes. Lower invol.-glume $\frac{1}{4}$ in. long, scarcely longer than the lowest flowering glume, ovate-lanceolate, apiculate; upper invol.-glume $\frac{1}{3}$ in. long, strongly 5-nerved. Fl. B. I. v. 7, p. 328; Trim. Fl. Ceyl. v. 5, p. 299; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441.—Flowers: Nov.

GUJARAT: Porbandar (Kathiawar), *Bhiva*! SIND: *Stocks*!—DISTRIB. Ceylon, Arabia, East Tropical Africa.

53. **DIPLACHNE,** Beauv.

Tall tufted perennial (?) grasses; stems erect or ascending, stout or slender, simple or sparingly branched. Leaves flat or convolute, narrow. Spikelets few- or many-flowered, sessile, 1-seriate on the slender spike-like branches of a contracted subsimple erect panicle, not articulate at the base, strongly laterally compressed; rhachilla articulate between the flowering glumes, not produced beyond the uppermost neuter. Invol.-glumes unequal, membranous, 1-nerved, obtuse, persistent; floral-glumes rather longer, elliptic-oblong, 1–3-nerved, the tip 2–4-toothed, mucronate or awned; palea linear. Lodicules 2, broadly cuneate. Stamens 3; anthers short. Styles short, distinct, with distant bases and short plumose laterally exserted stigmas. Grain oblong, stipitate, concavo-convex, free in the glumes.—DISTRIB. Species about 20, in warm regions.

1. **Diplachne fusca,** *Beauv. Agrost.* (1812) p. 163. Stems tufted, 2-4 ft. high, stout, erect or geniculately ascending, simple or branched (sometimes proliferously), terete, polished, with long internodes. Leaves 6–10 by $\frac{1}{20}$–$\frac{1}{10}$ in., flat or convolute, strict, erect, smooth, finely acuminate; sheaths smooth, the mouth truncate (not auricled); ligule oblong, membranous, lacerate. Panicle 6–12 in. long, erect, narrowly oblong; rhachis smooth; branches spike-like, the lower 1–4 in. long. Spikelets erect, rather distant, $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear-oblong, 4–10-flowered; rhachilla slender; pedicels short. Lower invol.-glume $\frac{1}{12}$ in. long, oblong-lanceolate; upper invol.-glume nearly $\frac{1}{8}$ in. long, ovate-oblong, subacute, broader than the lower; floral glumes $\frac{1}{6}$ in. long (including mucro), elliptic, thinly coriaceous, 3-nerved, the tip 2-toothed, mucronate by the produced midrib; palea oblong, obtuse, the keels silkily hairy. Anthers $\frac{1}{20}$ in. long. Fl. B. I. v. 7, p. 329; Trim. Fl. Ceyl. v. 5, p. 300; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1225.

KONKAN: Matunga near Bombay in rice-fields, *Woodrow*, 10!—DISTRIB. India (upper Gangetic plain, Bengal, W. Peninsula); Ceylon, Egypt, Tropical Asia, Africa, and Australia.

54. **GRACILEA,** Kœn.

Small tufted grasses. Leaves short. Spikelets 2-flowered, collected in turbinate fascicles which are secund, sessile and articulate on a slender spike. Spikelets not articulate at the base; rhachilla usually produced beyond the upper glume, filiform, scaberulous; callus 0. Glumes 4; invol.-glumes elongate-subulate, rigid, ciliate at the base and ending in rigid scabrid awns, persistent, collateral at base and laterally attached to base of spikelet; lower without hyaline margins;

the upper with rather wide ones; lower floral glume 2-sexual, chartaceous, ovate-oblong, cymbiform, shortly awned, 3-nerved, the palea as long as the glume, 2-cuspidate and with scaberulous keels, the lodicules minute, cuneiform, truncate; upper floral glume like the lower, but much smaller, bicuspidate, male; sometimes an imperfect flower of 2 empty glumes at the end of the rhachilla. Stamens 3; anthers of 2-sexual flowers large, of male flowers small. Styles free; stigmas slender, with short simple hairs, laterally exserted. Grain linear-oblong, free within the glumes.—DISTRIB. Species 2, Indian and African.

1. **Gracilea Royleana,** *Hook. f. in Fl. B. I.* v. 7 (1896) p. 284. Annual; stems 3–8 in. high, densely tufted, very slender. Leaves 1–2 in. long, scarcely reaching $\frac{1}{16}$ in. broad, flat or convolute, linear-lanceolate, acutely pointed, glabrous or nearly so, the margins ciliate; sheaths with a few long scattered hairs; ligule a hairy ridge. Spikes filiform, $\frac{1}{2}$–2 in. long, flexuous, often recurved; rhachis 3-gonous, smooth. Clusters of spikelets $\frac{1}{4}$–$\frac{1}{3}$ in. long (including the awns), green or purple; awns of invol.-glumes longer than the glumes; awn of floral glumes short. Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1226. *Melanocenchris Royleana*, Nees, in Proc. Linn. Soc. v. 1 (1841) p. 95 (*nomen nudum*); Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 370. *M. Jacquemontii*, Jaub. & Spach, Illustr. Pl. Or. v. 4 (1850–1853) p. 36, t. 325. *M. Rothiana*, Dalz. & Gibs. Bo. Fl. p. 297 (*not* of Nees).

KONKAN: *Law!*, *Woodrow*. DECCAN: near Poona, *Jacquemont*, 383! S. M. COUNTRY: Belgaum, *Stocks!*, *Ritchie*, 831!—DISTRIB. India (Behar, Rajputana, W. Peninsula); Socotra, Nubia.

VAR. *plumosa*, Hook. f. Fl. B. I. (*l. c.*) p. 284. Clusters of spikelets larger, $\frac{1}{2}$ in. long, including the awns. *Melanocenchris plumosa*, Jaub. & Spach, Illustr. Pl. Or. v. 4 (1850–1853) p. 37.

SIND, *Stocks*, 646!; Jemadar ka Landa near Karachi, *Stocks*, 646!—DISTRIB. India (the Panjáb); Arabia, Abyssinia.

55. MICROCHLOA, R. Br.

Slender usually perennial grasses. Leaves narrow, often subsetaceous; ligule a minutely ciliate rim. Spikelets 1-flowered, small, sessile, unilateral, crowded on the flattened rhachis of a solitary terminal slender curved spike, alternately 2-seriate from near the margins of the rhachis or in a single row; rhachilla disarticulating above, the invol.-glumes more or less produced. Floret hermaphrodite. Glumes 3; invol.-glumes subpersistent, strongly 1-nerved, flattened on the back or keeled, subequal; floral glume small, oblong, hyaline, awnless; palea nearly equalling the glume, 2-keeled. Lodicules 2, cuneate, glabrous. Stamens 3; anthers linear. Styles distinct; stigmas plumose, laterally exserted. Grain oblong, glabrous, free within the glumes.—DISTRIB. Species 7, one widely distributed throughout the Tropics, 3 in Africa, 3 in Australia.

1. **Microchloa setacea,** *R. Br. Prodr.* (1810) p. 208. Perennial; stems tufted, 2–6 (rarely reaching 10) in. high, very slender, branched or almost simple, compressed below, glabrous, smooth. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in.

long, crowded at the base, subsetaceous with an acute or callous point, plicate, firm, the lower often curved, usually glabrous. Spike solitary, 1–3 in. (rarely reaching 6 in.) long; very slender, usually curved, often purplish; rhachis minutely ciliate. Spikelets 1-flowered, dorsally compressed, in a single row, $\frac{1}{12}$–$\frac{1}{8}$ in. long, erect glabrous. Involucre-glumes subequal, lanceolate-oblong, acute or acuminate; floral glume up to $\frac{1}{15}$ in. long, abruptly and shortly acuminate, sometimes mucronulate, hairy along the nerves; palea ciliate on the nerves. Anthers about $\frac{1}{40}$ in. long. Grain oblong, subfusiform, $\frac{1}{20}$ in. long, smooth. Fl. B. I. v. 7, p. 283; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1226. *Rottboellia setacea*, Roxb. Fl. Ind. v. I (1832) p. 357; Cor. Pl. v. 2, t. 132.—Flowers: Aug.

S. M. Country: Dharwar, *Woodrow*.

Usually a very small plant growing on old walls. It rarely exceeds 3 inches high, though occasionally, under favorable conditions, it grows higher.—Distrib. Tropics of the Old and New World.

56. **CYNODON,** Pers.

Perennial glabrous grasses; stems creeping, rooting at the nodes and emitting from them fascicles of barren shoots and flowering stems. Spikes 2–6, in terminal umbels. Spikelets 1-flowered, laterally compressed, sessile, imbricate, alternately 2-seriate and unilateral on a slender keeled rhachis; rhachilla disarticulating above the involucre-glumes, produced or not beyond the floral glume. Floret hermaphrodite. Involucre-glumes narrow, keeled, acute or subulato-mucronate, the upper usually deciduous with the floral glume, the lower subpersistent; floral glume exceeding the involucre-glumes, navicular, firmly membranous, 3-nerved, awnless, the keel ciliate; palea somewhat shorter than the glume, 2-keeled. Lodicules 2, minute, obovate-cuneate, glabrous. Stamens 3. Ovary glabrous; styles distinct, slightly shorter than the plumose stigmas. Grain oblong, subterete, free within the glumes.—Distrib. Species 2, of which 1 occurs in S. Africa, the other almost cosmopolitan.

1. **Cynodon dactylon,** *Pers. Syn.* v. 1 (1805) p. 85. Stem slender, prostrate, widely creeping, forming matted tufts, with slender erect or ascending flowering branches 3–12 in. high. Leaves $\frac{3}{4}$–4 by $\frac{1}{20}$–$\frac{1}{8}$ in., narrowly linear or lanceolate, finely acute to pungent, more or less glaucous, soft, smooth, usually conspicuously distichous in the barren shoots and at the base of the stems; sheaths tight, glabrous or hairy, sometimes bearded at the mouth; ligule a very fine ciliate rim. Spikes 2–6, radiating from the top of a slender peduncle, 1–2 in. long, green or purplish; rhachis slender, compressed or angled, scaberulous. Spikelets $\frac{1}{15}$–$\frac{1}{10}$ in. long; rhachilla produced, very slender, equalling $\frac{1}{2}$ the length of the spikelet. Involucre-glumes lanceolate, acute to subulato-mucronulate, the lower $\frac{1}{25}$–$\frac{1}{16}$ in. long, the upper slightly longer; floral glume obliquely oblong to semiovate, about $\frac{1}{12}$ in. long. Anthers oblong, $\frac{1}{25}$ in. long. Grain $\frac{1}{24}$ in. long. Fl. B. I. v. 7, p. 288; Dalz. & Gibs. p. 297; Trim. Fl. Ceyl. v. 5, p. 274; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 365; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1227; Watt, Dict. Econ. Prod.

v. 2, p. 678. *Panicum dactylon*, Linn. Sp. Pl. (1753) p. 58; Grah. Cat. p. 236.—VERN. *Hariáli.*

The well-known *Hariáli* grass of the Deccan, extensively used as fodder in the Bombay Presidency.—DISTRIB. Throughout India, Birma, and Ceylon, ascending to 5000 ft. in the Himalayas; most warm countries.

57. CHLORIS, Sw.

Annual or perennial grasses. Leaves flat or convolute. Spikes solitary or several, in terminal umbels or short racemes, erect or stellately spreading. Spikelets of 2-4 florets (1 only or rarely more fertile), sessile, crowded, unilateral, 2-seriate on a slender rhachis; rhachilla disarticulating above the invol.-glumes, more or less produced; lowest floret hermaphrodite, the second male or barren (rarely fertile), the following if present barren, often minute (some occasionally fertile in *C. tenella*). Involucral glumes 2, persistent, narrow, keeled, membranous, 1-nerved, acute, mucronate or the upper awned. HERMAPHRODITE FLORET: floral glume narrow or broad, 3-nerved, acute or obtuse, minutely 2-toothed, usually awned from below the apex, often ciliate; palea almost equalling the glume, 2-keeled. Lodicules 2, minute. Stamens 3. Ovary glabrous; styles distinct, short; stigmas laterally exserted. MALE FLORET: glume and palea as in the hermaphrodite flower but smaller and glabrous. RUDIMENTARY FLORETS glabrous, awned or awnless, small to minute, usually without a trace of a palea.—DISTRIB. Species 40–45, in tropical and subtropical regions of both hemispheres.

Annual; spike solitary; spikelets cuneate, 3-awned; glumes 5–6; glume of hermaphrodite floret cuneate, the upper margin naked	1. *C. tenella.*
Perennial; spikes 1–3; spikelets obconic, 4-awned; glumes 5; glume of hermaphrodite floret broadly ovate, with broad hyaline margins, hirsute all over	2. *C. villosa.*
Perennial; spikes 4–6, in terminal whorls; spikelets narrowly fusiform; glumes 4, the uppermost minute on the produced rhachilla; glume of hermaphrodite floret oblong-lanceolate.	3. *C. incompleta.*
Perennial; spikes 5–20 in a truncate fascicle; spikelets 3-awned; margins of glume of hermaphrodite floret densely bearded above the middle, not hyaline	4. *C. barbata.*

1. **Chloris tenella,** *Roxb. Fl. Ind.* v. 1 (1832) p. 329. Annual, very slender; stems 10–18 in. long, weak, slender, branched from the base. Leaves 3–8 by $\frac{1}{8}$–$\frac{1}{4}$ in., flaccid, linear-lanceolate, finely acuminate, the margins more or less ciliate towards the base; sheaths glabrous; ligule large, membranous, truncate. Spike solitary, 1–2 in. long, erect, flat. Spikelets large, reaching $\frac{1}{4}$ in. long, cuneate, bifarious, 3-awned. Glumes 5 or 6; lower invol.-glume $\frac{1}{6}$ in. long, strongly 1-nerved; upper invol.-glume longer and broader, with a strong midnerve which is produced into a short awn; glume of hermaphrodite floret $\frac{1}{5}$ in. long, broadly cuneate, the upper margin truncated, naked, and with a scaberulous awn $\frac{1}{6}$ in. long from the back below the apex, the palea elliptic with ciliate margins, and the callus densely hairy, the next or second floral glume smaller but similar, with a similar palea, the others still smaller fan-shaped awned. Sometimes one or more of the normally infertile glumes are found to be fertile, at other times all are barren; both forms may be found among the specimens in

Herb. Kew. Fl. B. I. v. 7, p. 290; Dalz. & Gibs. p. 296; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 368; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440.

DECCAN: Bijapur, *Woodrow*. GUJARAT: Surat on the city walls, *Dalzell*! SIND: Jemadar ka Landa near Karachi, *Stocks*!—DISTRIB. India (W. Peninsula); Arabia, Abyssinia.

2. **Chloris villosa,** *Pers. Syn.* v. 1 (1805) p. 87. Perennial, stout; stems 6–10 in. long from a densely tufted stout woody base, clothed with equitant leaf-sheaths. Leaves 1–3 by $\frac{1}{16}$–$\frac{1}{10}$ in., linear, acute, flat, convolute or twisted, rigid; ligule obscure. Spikes 1–3, erect, pale yellow, $1\frac{1}{2}$–$2\frac{1}{2}$ by $\frac{1}{3}$–$\frac{1}{2}$ in. Spikelets $\frac{1}{8}$ in. long, obconic, with 4 unequal awns. Glumes 5; lower invol.-glume $\frac{1}{8}$ in. long (including a short awn), oblong-lanceolate, hyaline; upper invol.-glume $\frac{1}{6}$ in. long, oblong, hyaline, 2-toothed at the tip and shortly awned; glume of the hermaphrodite floret $\frac{1}{8}$ in. long, broadly ovate or suborbicular, concave, with an awn $\frac{1}{4}$ in. long or more, and broad hyaline margins bounded by the lateral nerves, hirsute all over with long silky hairs which are much longer than the glume, the palea elliptic-obovate with ciliate margins, hyaline; the next glume (4th) barren, about $\frac{1}{2}$ as long, also hirsute, the next (5th) small, cuneate, the 6th reduced to an awn. Fl. B. I. v. 7, p. 291; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440. *Chloris tetrapogon*, Beauv. Agrost. (1812) p. 158. *Tetrapogon villosus*, Desf. Fl. Atlant. v. 2 (1798) p. 389, t. 255.

SIND: *Stocks*, 644!—DISTRIB. India (Panjáb, Rajputana); westward to the Canaries.

3. **Chloris incompleta,** *Roth, Nov. Pl. Sp.* (1821) p. 60. Perennial; stems procumbent, or erect when growing amongst bushes, reaching a height of 5 ft., ending in a very long naked peduncle. Leaves 6–12 by $\frac{1}{6}$–$\frac{1}{2}$ in., narrowed into a fine point, flat, glabrous or slightly hairy; sheaths long, smooth, the mouth hairy; ligule of long hairs. Spikes 4–6, in terminal whorls, 4–9 in. long; rhachis filiform, scabrid. Spikelets $\frac{1}{5}$ in. long (excluding the awns), narrowly fusiform, imbricating, erect, closely appressed; rhachilla slender, bearing $\frac{1}{16}$ in. from its base a tuft of hairs, a little above which is a barren glume terminated by a long awn reaching $\frac{1}{3}$ in. long. Glumes 4; lower invol.-glume $\frac{1}{10}$ in. long, lanceolate, acute; upper invol.-glume $\frac{1}{6}$ in. long (excluding awn), narrowly lanceolate, membranous, 2-toothed at the apex, with a strong midnerve which is produced into an awn $\frac{1}{20}$ in. long; floral glume of fertile floret as long as the upper invol.-glume, oblong-lanceolate, 2-toothed at the apex, with an awn $\frac{3}{8}$ in. long; palea as long as the glume, acuminate; callus bearded; fourth glume small, rudimentary. Sir J. Hooker (Fl. Ceyl. v. 5, p. 275) describes the barren 4th glume as a swelling of the rhachilla which it much resembles. Fl. B. I. v. 7, p. 290; Trim. Fl. Ceyl. v. 5, p. 275; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1227. *Chloris digitata*, Steud. Syn. Gram. (1855) p. 207; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 369. *Melica digitata*, Roxb. Fl. Ind. v. 1 (1832) p. 326; Grah. Cat. p. 236.—Flowers: Feb.

KONKAN: Thána, *Lisboa*. DECCAN: Nasik, *Lisboa*. KANARA: (N. Kanara), *Woodrow*. —DISTRIB. Throughout the plains of India; Ceylon, Afghanistan, China.

4. **Chloris barbata,** *Sw. Fl. Ind. Occ.* v. 1 (1797) p. 200. Perennial; stems tufted, with strong root-fibres, rather stout, 2–3 ft. high, geniculately ascending, branching upwards, leafy, quite smooth; lower internodes 2–3 in. long, as thick as a crow-quill, shining; upper very long, slender; nodes often bearing equitant tufts of leaves. Leaves 6–18 in. long, narrowly linear, flat or folded, finely acuminate; sheaths smooth, the lower open; ligule a very narrow membrane. Spikes 5–20, digitately arranged in a truncate fascicle, ½–4 in. long, on a slender peduncle, often purplish. Spikelets $\frac{1}{10}$ in. long (excluding the awns), green or purple, 3-awned; rhachilla produced, but not beyond the fertile glume, bearing 2 small turgid obovate awned barren glumes $\frac{1}{16}$ in. long, the awns $\frac{1}{8}$–$\frac{1}{6}$ in. long. Involl.-glumes hyaline, lanceolate, acute (not awned); lower $\frac{1}{16}$ in. long; upper $\frac{1}{10}$ in. long; floral glume of hermaphrodite floret $\frac{1}{10}$ in. long, broadly elliptic, shortly apiculate, with a slender awn $\frac{1}{8}$–$\frac{1}{6}$ in. long and with densely bearded margins above the middle; palea nearly as long as the glume, oblanceolate. Fl. B. I. v. 7, p. 292; Grah. Cat. p. 234; Dalz. & Gibs. p. 296; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 367; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1227; Watt, Dict. Econ. Prod. v. 2, p. 269.—Flowers: Nov. VERN. *Gondvel.*

Throughout the Presidency. DECCAN: *Woodrow.* SIND: *Woodrow.*—DISTRIB. Throughout the plains of India; Ceylon, Tropics generally.

58. **TRIPOGON,** Roth.

Slender densely tufted grasses; stems erect, leafy below. Leaves narrow, rigid, flat or convolute. Spikelets usually many-flowered (all except 1–2 terminal perfect), 2-seriate and unilateral on a very slender terminal spike, not articulate at the base; rhachilla produced between the glumes but not beyond them, slender, articulate at the base. Glumes many; involl.-glumes unequal, distantly superposed, membranous, 1-nerved; lower involl.-glume usually lodged in a furrow of the rhachis, toothed or lobed on one side; upper involl.-glume entire or notched below the mucronate or apiculate tip; floral glumes ovate, dorsally convex, 2-fid and awned in the cleft or 4-fid with the outer lobes awned, the inner lobes membranous and rarely awned, awns all straight; callus short, bearded; palea broad or narrow, complicate, truncate, with ciliate keels. Lodicules 2, cuneate. Stamens 3; anthers long, linear-oblong. Styles short, distant at the base; stigmas short, plumose. Grain narrow, free in the glumes.—DISTRIB. Tropical and Subtropical Asia and Africa; species about 12.

Awn as long as its glume or longer; lateral lobes of floral glume awned.
- Under 3 in. high; leaves 1 in. long; ligule membranous, ovate ..... 1. *T. pauperculus.*
- 6–18 in. high; cauline leaves 6–8 in. long; ligule a ridge ..... 2. *T. capillatus.*

Awn shorter than its glume; lateral lobes of floral glume not awned.
- Leaves 12–24 in. long; spikelets 5–12-flowered; lower involl.-glume $\frac{1}{2}$ in. long, lanceolate ..... 3. *T. Lisboæ.*
- Leaves 2–8 in. long; spikelets 10–20-flowered; lower involl.-glume $\frac{1}{8}$ in. long with a projecting lobe at one side ..... 4. *T. Jacquemontii.*

1. **Tripogon pauperculus** (by misprint *pauperulus*), *Stapf, in Hook. Icon. Pl.* t. 2442 (1896). Dwarf, 2–2½ in. high, annual, glabrous; stems capillary, densely tufted, leafy to the tip. Leaves setaceous, acute, ½–1 in. long, involute; sheaths, the lowest lax, the uppermost close, striate; ligule membranous, ovate, obtuse. Spikelets 2-3, remote (distant more than their own length from each other), or solitary at the apex of the stems, ⅓ in. long (excluding the awns). Lower invol.-glume ⅙ in. long, symmetrical, narrowly lanceolate, 1-nerved, very acute; upper invol.-glume ¼ in. long, lanceolate, cuspidately acuminate; floral glumes 4–1, with one or two empty above them, ⅕–¼ in. long (excluding the awn), linear-oblong, 3-nerved, the lateral lobes with capillary awns; median awn geniculate, twisted below the knee, nearly ½ in. long; palea oblong with ciliolate keels. Anthers 3, minute, subglobose. Grain narrowly linear, cylindric. Fl. B. I. v. 7, p. 285; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440.—Flowers: Sept.

KONKAN: *Stocks*! DECCAN: on the crest of the Western Ghâts (1800 ft.), 8 miles S. of Lanoli, on *Ficus glomerata*, in company with mosses and *Utricularia orbiculata*, *Woodrow*, 25!; on rocks near Karli (Poona districts), *Woodrow*!—DISTRIB. India (W. Peninsula).

2. **Tripogon capillatus,** *Jaub. & Spach, Illustr. Pl. Or.* v. 4 (1850–53) p. 47, t. 332. Whole plant 6–18 in. high; stems densely tufted, erect or geniculately ascending, subfiliform, smooth. Leaves rigid, green, convolute, the radical leaves very short or reduced to sheaths, the cauline erect, elongate, 6–8 by ⅛ in., narrowly linear, finely pointed; sheaths glabrous, striate; ligule reduced to a ridge. Spikes 5–12 in. long, filiform or capillary, flexuous. Spikelets 3–4-flowered, distant (½ in. apart or more) along the rhachis of the spike, with many slender long awns. Invol.-glumes lanceolate, thinly membranous; lower invol.-glume $\frac{1}{10}$ in. long, cuspidately acuminate; upper invol.-glume ⅕ in. long (including a short awn); floral glume ⅙ in. long, ovate-lanceolate, 2-cleft at the apex, the lobes slender, shortly awned, the median awn reaching ½ in. long or more; palea as long as its glume, narrow, oblanceolate-oblong, hyaline. Anthers $\frac{1}{16}$ in. long. Fl. B. I. v. 7, p. 285; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1229.—Flowers: Sept.

KONKAN: *Stocks*!, *Law*!; on trees at Matheran, *Woodrow*, 17!, *Lisboa*. DECCAN: on trees about Poona, *Jacquemont*, 580! S. M. COUNTRY: Belgaum, on trees on Samboti Hill, *Ritchie*, 866!—DISTRIB. India (Behar, W. Peninsula).

3. **Tripogon Lisboæ,** *Stapf, in Kew Bull.* (1892) p. 84. Perennial, 2–3 ft. high; stem stout or slender. Leaves 12–24 by ⅙–⅓ in., rigid, quite smooth, flat or convolute; sheaths glabrous; ligule obsolete. Spikes 6–10 in. long, narrow. Spikelets usually densely crowded, ⅙–½ in. long, 5–12-flowered. Glumes coriaceous; invol.-glumes very unequal; lower invol.-glume $\frac{1}{12}$ in. long, lanceolate, acute; upper invol.-glume ⅕ in. long, linear-oblong, with a single tooth or unequally 2-toothed at the apex; floral glumes ⅛ in. long, ovate, shortly 2-toothed at the apex; the lobes not awned, but with a slender awn about $\frac{1}{30}$ in. long from the sinus; palea oblong, obtuse, shortly 2-fid. Grain narrowly oblong, terete, glabrous. Fl. B. I. v. 7, p. 286; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440.

Lisboa without locality in Herb. Kew.! KONKAN: *Stocks*!, *Law*! DECCAN: Karli between Poona and Lanoli, *Jacquemont*, 581!—DISTRIB. India (Rajputana).

4. **Tripogon Jacquemontii,** *Stapf, in Kew Bull.* (1892) p. 85. Perennial, 1–2 ft. high. Leaves filiform, 2–8 in. long, convolute, glabrous. Spikes 4–8 in. long, narrow. Spikelets $\frac{1}{3}$–$\frac{3}{4}$ in. long, narrow, oblong, 10–20-flowered. Glumes subcoriaceous, the uppermost empty; invol.-glumes very dissimilar; lower invol.-glume $\frac{1}{8}$ in. long, acute, with a large projecting blunt tooth or lobe at one side extending $\frac{1}{2}$ way up; upper invol.-glume $\frac{1}{6}$ in. long, lanceolate-oblong, acute; floral glume $\frac{1}{8}$ in. long, elliptic, shortly 2-fid at the apex, without lateral awns but with a median awn $\frac{1}{20}$ in. long. Grain narrowly oblong, terete, glabrous. Fl. B. I. v. 7, p. 286; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 371; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440.

KONKAN: Bombay districts without precise locality, *Lisboa*!; Matheran, *Woodrow*, 16! DECCAN: *Woodrow*, 79!; Poona, *Jacquemont*, 353!, *Woodrow*!; Sholapur, *Pinwill*!; near Ahmednagar, *Miss Shatuck*!—DISTRIB. India (Bengal, Central India, W. Peninsula).

59. **ELEUSINE,** Gærtn.

Annual or perennial grasses. Leaves long or short. Spikelets 3–12-flowered (flowers all perfect except the terminal), sessile, 2–3-seriate and secund, forming digitate capitate or whorled spikes laterally compressed not jointed at the base; rhachilla continuous between the flowering glumes. Glumes few or many, keeled; invol.-glumes shorter than the floral ones, subequal or unequal, persistent; lower invol.-glume ovate or lanceolate; upper invol.-glume lanceolate, acute or acuminate, or broadly ovate or didymous, with a short stout recurved awn; floral glumes like the involucral, 3-nerved; palea complicate, strongly 2-keeled. Lodicules 2, cuneate. Stamens 3; anthers short. Styles short, free; stigmas slender, laterally exserted. Grain small, free; pericarp hyaline, loose. Seed rugose.—DISTRIB. Species about 7, in most warm countries.

Spikelets pointing forwards at an acute angle with the rhachis of the spike; upper invol.-glume ovate or lanceolate.	
Annual, erect; leaves 1–2 ft. long	1. *E. indica.*
Perennial, prostrate; leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. long	2. *E. flagellifera.*
Spikelets spreading, at right angles to the rhachis of the spike; upper invol.-glume orbicular, abruptly awned.	
Annual; grain subglobose	3. *E. ægyptiaca.*
Perennial; grain ovoid	4. *E. aristata.*

1. **Eleusine indica,** *Gærtn. Fruct.* v. 1 (1788) p. 8. Annual, erect; stem 1–2 ft. high, tufted, slightly compressed, glabrous; roots of strong fibres. Leaves distichous, flat or folded, as long as the stem, $\frac{1}{8}$–$\frac{1}{4}$ in. broad, linear, glabrous or sparsely hairy, with nearly smooth margins; sheaths compressed, the mouth not auricled but often with a few hairs; ligule a thin slightly hairy membrane. Spikes 2–7 or more, 2–5 in. long, with sometimes one or two detached spikes below the umbel, digitate, suberect or slightly recurved, the axils hairy and glandular; rhachis flattened. Spikelets pointing forward at an acute angle with the rhachis of the spike, variable in size, $\frac{1}{10}$–$\frac{1}{6}$ in. long, 3–6-flowered, glabrous. Invol.-glumes unequal, membranous; lower $\frac{1}{16}$ in. long, ovate-oblong, acute, 1-nerved; upper $\frac{1}{10}$ in. long, ovate-oblong, subacute, very shortly apiculate, with 3–7 green nerves; floral glumes gibbously ovate-oblong, obtuse, $\frac{1}{8}$ in. long; palea shorter than the glume, oblong-lanceolate, subacute. Anthers $\frac{1}{30}$ in. long. Grain oblong, obtusely

trigonous, obliquely striate, reddish-brown. Fl. B. I. v. 7, p. 293; Grah. Cat. p. 235; Trim. Fl. Ceyl. v. 5, p. 277; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 375; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1229; Watt, Dict. Econ. Prod. v. 3, p. 241.—Flowers: Jan. VERN. *Mahar-náchni.*

Throughout the Presidency, *Lisboa.* DECCAN: Poona, *Woodrow.* — DISTRIB. Throughout the plains of India; Ceylon, Tropics of the Old World.

2. **Eleusine flagellifera,** *Nees, in Linnæa,* v. 16 (1842) p. 220. Perennial, prostrate, proliferously branched, glaucous; stems smooth, stiff, widely spreading, rooting at the distant thickened leafy nodes and sending up slender branches; internodes 4–8 in. long. Leaves $\frac{1}{2}$–$1\frac{1}{2}$ by $\frac{1}{16}$–$\frac{1}{8}$ in., linear-lanceolate, acuminate, rigid, distant, flat or tortuous, recurved, the upper very short; sheaths glabrous; ligule a hairy line. Spikes 3–6, digitate, $\frac{3}{4}$–$1\frac{1}{2}$ by $\frac{1}{6}$–$\frac{1}{3}$ in.; rhachis slender, flexuous, pubescent. Spikelets imbricate, subsessile or very shortly pedicellate, 4-6-flowered, $\frac{1}{8}$–$\frac{1}{3}$ in. long. Lower invol.-glume rather less than $\frac{1}{8}$ in. long, ovate, acute, membranous; upper invol.-glume $\frac{1}{6}$ in. long, lanceolate, aristate, coriaceous, with broad membranous margins; floral glumes $\frac{1}{5}$ in. long, ovate, acute, apiculate, chartaceous, 3-nerved, the midnerve compound, the margins membranous, hairy below; palea oblong with ciliate keels. Anthers $\frac{1}{16}$ in. long. Fl. B. I. v. 7, p. 294; Duthie, Fodd. Grass. N. Ind. p. 57; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 377; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Watt, Dict. Econ. Prod. v. 3, p. 241.

DECCAN: Poona, *Lisboa*; Khandesh, *Lisboa.* SIND: *Dalzell!, Stocks,* 765!— DISTRIB. India (Panjáb, W. Peninsula); Afghanistan, N. Africa.

3. **Eleusine ægyptiaca,** *Desf. Fl. Atlant.* v. 1 (1798) p. 85 (*ægyptia*). Annual of variable habit, 1–$1\frac{1}{2}$ ft. high: stems sometimes prostrate, rooting from the proliferously branched nodes, geniculately ascending, compressed, glabrous, smooth. Leaves linear, 1–5 by $\frac{1}{12}$–$\frac{1}{6}$ in., tapering to a fine point, flat, glaucous, glabrous or hairy or hispidly ciliate with bulbous-based hairs; ligule a slightly ciliolate line. Spikes 2–6, digitately radiating, $\frac{1}{2}$–$1\frac{1}{2}$ in. long; rhachis trigonous or dorsally flattened, rigid, often excurrent into a pungent mucro. Spikelets many, 3–5-flowered, spreading at right angles to the rhachis, up to $\frac{1}{8}$ in. long. Glumes divaricate; lower invol.-glume ovate, acute, $\frac{1}{12}$ in. long; upper invol.-glume $\frac{1}{12}$ in. long (excluding the awn), suborbicular, the midnerve produced into a usually curved awn often as long as or sometimes longer than the glume; floral glumes gibbously ovate, up to $\frac{1}{8}$ in. long, mucronate or awned; palea rather shorter than its glume, ovate-oblong, obtuse or 2-fid. Anthers about $\frac{1}{20}$ in. long. Grain subglobose, reddish, very rugose, $\frac{1}{25}$ in. in diam. Fl. B. I. v. 7, p. 295; Grah. Cat. p. 235; Trim. Fl. Ceyl. v. 5, p. 279; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 374; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1229; Watt, Dict. Econ. Prod. v. 3, p. 236. *Dactyloctenium ægyptiacum,* Willd. Enum. Hort. Berol. (1809) p. 1029; Dalz. & Gibs. p. 297.—Flowers: Sept.–Nov.

KONKAN: Ratnagiri, *Woodrow,* 41! DECCAN: Poona, *Jacquemont,* 399! and 486!; Sharanpur, near Nasik, *Woodrow.* S. M. COUNTRY: Badami, *Woodrow,* 12! SIND: *Stocks,* 637!—DISTRIB. Widely spread throughout tropical and subtropical regions.

4. **Eleusine aristata,** *Ehrenb. ex Boiss. Fl. Orient.* v. 5 (1881) p. 557. Perennial, slender, prostrate, proliferously branched; stem smooth, stiff, widely spreading, rooting at the distant thickened woody leafy nodes and sending up very slender branches 4–12 in. long; internodes 2–4 in. long. Leaves 1–4 by $\frac{1}{16}$–$\frac{1}{10}$ in., acuminate or pungent, glaucous, sparsely hairy, and the margins ciliate with bulbous based hairs; sheaths glabrous or sparsely hairy; ligule obsolete. Spikes 3 or more, $\frac{1}{4}$–$\frac{1}{2}$ in. long, spreading or decurved, bearded at the base; rhachis excurrent into a pungent point. Spikelets about $\frac{1}{6}$ in. long (including the awns). Lower invol.-glume $\frac{1}{10}$ in. long, ovate, acute or apiculate, 1-nerved, with ciliate keel; upper invol.-glume $\frac{1}{8}$ in. long (including an awn $\frac{1}{30}$ in. long), suborbicular; floral glumes nearly $\frac{1}{6}$ in. long, broadly ovate, acute, cuspidate, glabrous, keeled, membranous, with a strong midnerve and weak lateral nerves; palea broad, the keels scaberulous. Anthers $\frac{1}{20}$–$\frac{1}{12}$ in. long. Grain ovoid, rugose. Fl. B. I. v. 7, p. 296; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440. *Eleusine sindica,* Duthie, Fodd. Grass. N. Ind. (1888) p. 58; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 377. *Dactyloctenium sindicum,* Boiss. Diag. sér. 2, fasc. 4 (1859) p. 131.

KONKAN: Ratnagiri, *Woodrow.* GUJARAT: Ahmedabad, *Woodrow.* SIND: *Stocks,* 637!; Mundgiro, *Stocks,* 637!—DISTRIB. India (Panjáb, Rajputana, W. Peninsula); Beluchistan, Afghanistan, Arabia, Nubia.

Eleusine coracana, Gærtn. Fruct. v. 1 (1788) p. 8, t. 1. Stem 2–5 ft. high, often as thick as the thumb; leaves broad; spikes stout, $\frac{1}{2}$ in. broad and reaching 6 in. long; grain globose. Only known in cultivation; very like *Eleusine indica,* from which it has probably originated. It is extensively grown in the hilly districts of the Bombay Presidency, and the grain is largely consumed by the poorer classes. Fl. B. I. v. 7, p. 294; Grah. Cat. p. 235; Dalz. & Gibs. Suppl. p. 97; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 373; Prain, Beng. Pl. p. 1229; Watt, Dict. Econ. Prod. v. 3, p. 237.—VERN. *Náchni*; *Nágli.*

60. **DINEBRA,** Jacq.

An annual leafy grass. Leaves flat. Spikelets 2–3-flowered, 2-seriate, secund and imbricating on short slender spreading or deflexed spikes collected in narrow pyramidal racemes, not jointed at the base; rhachilla slender, jointed at the base, produced beyond the flowering glumes and bearing an imperfect glume. Glumes 4–5; invol.-glumes persistent, much longer than the floral, lanceolate, awned, 1-nerved, keeled; lower invol.-glume shorter than the upper; floral glumes small, broadly ovate, subacute, hyaline, 1-nerved; palea hyaline, shorter than the glume, linear-oblong, obtuse, with finely ciliolate keels. Lodicules 2, minute. Stamens 3; anthers minute, didymous. Styles free, short; stigmas exserted at the apex of the glume, shortly penicillate. Grain narrowly ovoid, obscurely trigonous.—DISTRIB. India, W. Peninsula, Ceylon, Afghanistan, and westward to Senegal.

1. **Dinebra arabica,** *Jacq. Fragm.* (1809) p. 77. Stems 1–3 ft. high, tufted, stout or slender, erect or geniculately ascending, leafy

throughout; nodes glabrous. Leaves 3–8 by $\frac{1}{8}$–$\frac{1}{5}$ in., linear, finely acuminate, flaccid, glabrous or sparsely hairy, contracted at the insertion; sheaths thin, loose, glabrous; ligule a narrow lacerate membrane. Spikes $\frac{1}{2}$–$1\frac{1}{2}$ in. long, racemosely arranged along the axis of an inflorescence 4–12 in. long, alternate, single or in fascicles of 2–3 together; rhachis dorsally flattened, ventrally trigonous. Spikelets $\frac{1}{5}$ in. long (including the awns), alternate, sessile. Invol.-glumes lanceolate, hyaline, keeled, with slightly recurved minutely scaberulous awns, the lower invol.-glume shorter than the upper; floral glumes reaching $\frac{1}{10}$ in. long, ovate-oblong, subacute, white. Anthers $\frac{1}{40}$ in. long. Grain ellipsoid-oblong, trigonous, $\frac{1}{20}$ in. long, pale brown. Fl. B. I. v. 7, p. 297; Trim. Fl. Ceyl. v. 5, p. 280; Duthie, Fodd. Grass. N. Ind. p. 55; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 372; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1230; Watt, Dict. Econ. Prod. v. 3, p. 115. *Leptochloa calycina*, Kunth, Revis. Gram. v. 1 (1829) p. 91; Dalz. & Gibs. p. 296.—Flowers: Aug.

KONKAN: *Law!*, *Stocks!* DECCAN: Poona, *Woodrow*. GUJARAT: banks of the Tapti above Surat, *Dalzell & Gibson*; Surat, *Woodrow*; Morvi (Kathiawar), *Woodrow*. —DISTRIB. India (W. Peninsula); Ceylon, Afghanistan, and westward to Senegal.

61. **ENNEAPOGON,** Desv.

Perennial grasses. Leaves narrow, often convolute; ligules reduced to a line of hairs. Spikelets 3-flowered, in contracted or spike-like panicles; rhachilla disarticulating above the glumes; lowest floret hermaphrodite, the intermediate male or barren, the uppermost rudimentary. Invol.-glumes persistent, membranous, acute, obtuse or minutely truncate, 3–9-nerved. HERMAPHRODITE FLORET: glume very broad, much shorter (excluding the awns) than the invol.-glumes, 9-nerved, 9-awned, the awns subulate, equal or subequal, plumose, ciliate, or scaberulous; callus minute, short; palea ovate-oblong, 2-keeled. Lodicules 2, minute, cuneate, fleshy. Stamens 3. Ovary glabrous; styles distinct, short; stigmas laterally exserted, plumose. Grain oblong. INTERMEDIATE FLORET like the lower, but the floral glume shorter, glabrous, the ovary rudimentary or suppressed. UPPERMOST FLORET rudimentary or reduced to a tuft of hairs.—DISTRIB. Species about 6, in the dry warm regions of the Old World and in Australia; 1 species in Western N. America.

1. **Enneapogon elegans,** *T. Cooke*. Stem 3–18 in. high, slender, wiry, erect or ascending from a subwoody often thickened base; nodes often tomentose. Leaves $\frac{1}{2}$–5 in. long, usually convolute, pungently pointed, more or less softly pubescent; sheaths puberulous; ligule a line of hairs. Panicle 1–3 in. long; branches very short; rhachis villous. Spikelets with their awns up to $\frac{1}{4}$ in. long or more, sessile and pedicellate, softly tomentose, nearly white. Lower invol.-glume $\frac{1}{6}$ in. long, lanceolate, acute, 5–7-nerved; upper invol.-glume $\frac{1}{5}$ in. long, lanceolate, acute, 7-nerved; glume of hermaphrodite floret orbicular below, cleft above into 9 subulate awn-like lobes which are plumose in the lower half; palea ovate, 2-keeled, the keels pubescent. *Pappophorum elegans*, Nees, in Wight, Cat. n. 1771 (1833); Fl. B. I. v. 7, p. 301; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440.

SIND: Karachi district, *Woodrow*.—DISTRIB. India (Peshawar, Birma, W. Peninsula).

62. **HYGRORHIZA,** Nees.

A floating glabrous grass; stems stoutish, diffusely branched, rooting in dense masses at the nodes; branches short, erect, leafy. Leaves oblong, obtuse. Spikelets few, erect, 1-flowered, articulated on the pedicels, but tardily deciduous, long-awned, lanceolate, on the few widely-spreading branches of a shortly pedunculate panicle. Invol.-glumes 0; floral glume solitary, thinly chartaceous, narrowed to an erect scaberulous awn, strongly 5-nerved, the nerves scabrid and ciliate, the lateral nerves marginal; palea much narrowed, 3-nerved, acuminate; with ciliate keel. Lodicules minute, suborbicular. Stamens 6; anthers long, very slender. Styles 2, free; stigmas plumose, laterally exserted. Grain oblong, narrowed at the base, obtuse, free within the glume and palea.—Distrib. India, Ceylon, Tonkin; species 1.

1. **Hygrorhiza aristata,** *Nees, in Edinb. N. Phil. Journ.* v. 15 (1833) p. 380. A glabrous floating grass; stem 1 ft. (and more) long, spongy, with feathery whorled roots at the nodes; internodes long or short. Leaves 1–3 by $\frac{1}{2}$–$\frac{3}{4}$ in., linear or ovate-oblong, obtuse, more or less scaberulous above, smooth and glaucous beneath, subcoriaceous, with smooth or slightly scaberulous margins, base rounded or subcordate; midrib short; sheaths smooth, inflated, somewhat auricled at the mouth, compressed, with ciliate margins; ligule a narrow membrane. Panicle about 2 in. long and broad, triangular; rhachis and branches slender, stiff, smooth, the lower branches sometimes deflexed. Spikelets very narrow, $\frac{3}{4}$ in. long (including the awn), sessile or pedicellate. Floral glume about $\frac{3}{8}$ in. long (excluding the awn), lanceolate, with 5 strong nerves, the lateral nerves forming thickened margins, hairy on the nerves outside, tapering into a long scaberulous awn as long as the body of the glume; palea as long as the glume. Fl. B. I. v. 7, p. 95; Trim. Fl. Ceyl. v. 5, p. 185; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1185; Wall, Dict. Econ. Prod. v. 4, p. 317. *Leersia aristata,* Roxb. Fl. Ind. v. 2 (1832) p. 207; Grah. Cat. p. 235. —Flowers: Apr.

Gujarat: Chikli, *Woodrow.*—Distrib. of the genus.

63. **LEERSIA,** Sw.

Tall perennial slender marsh-grasses. Leaves narrow, flat. Spikelets 1-flowered (the florets 2-sexual), in slender contracted usually flaccid panicles with very slender branches, articulate on the pedicels above the rudimentary glumes, strongly laterally compressed. Invol.-glumes reduced to an obscure hyaline entire or 2-lobed rim; floral glume solitary, oblong, acute, awnless, thinly chartaceous, 3–5-nerved, the lateral nerves forming the thickened margins of the glume, the keel and margins pectinately ciliate; palea narrow, linear or linear-lanceolate, as long as the glume, rigid, 3-nerved, dorsally ciliate and with hyaline margins. Lodicules 2. Stamens usually 6 (rarely 3 or fewer). Styles short, distinct; stigmas plumose, laterally exserted from the glume. Grain ovoid or oblong, compressed, free within the glume and palea.—Distrib. Species 6 or 7, mostly in the tropical and subtropical regions of both hemispheres.

1. **Leersia hexandra,** *Sw. Prod. Veg. Ind. Occ.* (1797) p. 131. Perennial; stems rooting in the mud, with floating flexuous branches several feet long, sending up erect or ascending slender leafy branches 2–4 ft. high, usually slender and weak, smooth, striate; nodes hairy with deflexed hairs. Leaves 3–8 by $\frac{1}{8}$–$\frac{1}{3}$ in., linear, tapering to a fine point, suberect, rather rigid, nearly glabrous, with scaberulous margins, base narrow; sheaths nearly smooth, glabrous, the margins ciliate; ligule short, obliquely truncate or 2-lobed, membranous. Panicle 2–4 in. long, pedunculate, oblong, laxly branched, narrow; rhachis filiform; branches filiform, flexuous, angular, smooth. Spikelets nearly $\frac{1}{6}$ in. long. Floral glume nearly $\frac{1}{6}$ in. long, ovate-oblong, somewhat boat-shaped, acute, shortly mucronate, strongly keeled, ciliate on the keel and margins, 5-nerved, the lateral nerves forming a thickened margin; palea as long as the glume, linear-lanceolate, subacute. Fl. B. I. v. 7, p. 94; Trim. Fl. Ceyl. v. 5, p. 184; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1185; Watt, Dict. Econ. Prod. v. 4, p. 619. *Leersia ciliata,* Roxb. Fl. Ind. v. 2 (1832) p. 207.—Flowers: Oct.

S. M. Country: Londa, *Gammie* ex *Woodrow.*—Distrib. More or less throughout India; Ceylon, Africa, America, Australia.

64. **ORYZA,** Linn.

Tall annual or perennial grasses. Leaves long, narrow, flat. Spikelets 1-flowered, loosely arranged on the branches of an elongate panicle, disarticulating above the 2 lowest glumes. Glumes 5; the 2 lower invol.-glumes below the articulation of the spikelet minute, scale-like (rarely absent); the 2 next invol.-glumes above the articulation of the spikelet subulate; floral glume solitary, dimidiate-oblong, coriaceous or chartaceous, 5–9-nerved, awnless or with a short or long straight terminal awn; palea linear or lanceolate, as long as the glume, 3–5-nerved, coriaceous, with membranous margins. Lodicules 2, entire or 2-lobed. Stamens 6; anthers linear. Style short, free; stigmas laterally exserted from the glume. Grain narrowly oblong, compressed, closely covered by or adnate to the glume and the palea.—Distrib. Species 5 or 6, tropical.

1. **Oryza coarctata,** *Roxb. Fl. Ind.* v. 2 (1832) p. 206. Stem 4–6 ft. high, erect from a stout creeping rhizome, smooth, hard and polished. Leaves 6–15 by $\frac{1}{4}$–$\frac{1}{2}$ in., coriaceous, linear, caudate-acuminate, with spinulose margins; sheaths glabrous, polished, reticulate like basket-work; ligule very narrow, fringed with short hairs. Panicles 4–8 in. long, spike-like; rhachis and branches trigonous, stiff, smooth. Spikelets reaching $\frac{5}{8}$ in. long (including the awn). Glumes 5, the outer (below the articulation of the spikelet) consisting of 2 opposite minute appressed rounded or truncate thick scales, one attached lower than the other; the 2 glumes above the articulation of the spikelet subulate, the lower of the pair $\frac{1}{10}$ in., the upper $\frac{1}{6}$ in. long. Floral glume solitary, $\frac{5}{8}$ in. long, lanceolate, boat-shaped, rounded and with a large projecting wing on the back, cuspidate with a stout hard glabrous white awn about $\frac{1}{6}$ in. long, 7–9-nerved, the lateral nerve forming a thickened margin to the glume. Palea (upper floral glume of some authors) $\frac{1}{2}$ in.

long, linear-lanceolate, cuspidately acuminate, with 5 strong nerves and hyaline margins. Lodicules large, membranous, subquadrate or trapeziform. Fl. B. I. v. 7, p. 93; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1184.

SIND: Karachi in Herb. Kew. without collector's name!; Shikarpur, *Dr. King's Collector*!—DISTRIB. India (Sundribans, W. Peninsula).

Oryza sativa, Linn. Sp. Pl. (1753) p. 333. The cultivated rice-plant which is the staple food of millions of the inhabitants of India. The wild form is said to be indigenous in Rajputana, Sikkim, Bengal, the Khasia Hills, Central India, the Circars, and Pegu. Watt, Dict. Econ. Prod. v. 5, pp. 498–654, gives an exhaustive account of the mode of culture and distribution of the rice-plant in India. Fl. B. I. v. 7, p. 92; Grah. Cat. p. 235; Dalz. & Gibs. Suppl. p. 98; Trim. Fl. Ceyl. v. 5, p. 182; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 435; Prain, Beng. Pl. p. 1183.

65. **CENTOTHECA,** Desv.

Tall leafy perennial grasses. Leaves broadly oblong or lanceolate, with trabeculate veins. Spikelets 1–3-flowered, on the long spike-like branches of a lax subsimple panicle, not articulate at the base, laterally compressed, all perfect or 1 or more upper neuter; rhachilla slender, articulate at the base and between the flowering glumes, not produced beyond the uppermost. Invol.-glumes distant at their insertions, ovate-oblong, persistent, empty, 3–5-nerved; upper invol.-glume larger than the lower; floral glumes broadly ovate, obtuse, apiculate, dorsally rounded, 7-nerved, naked or the upper usually bearing soft erect at length deflexed tubercle-based spines or bristles; palea narrow, with ciliolate keels. Lodicules 0. Stamens 2–3; anthers linear. Styles short, free; stigmas narrow, with short hairs. Grain ovoid, acute, terete, free within the glumes.—DISTRIB. Tropical Asia, Africa, Australia; species doubtfully 3.

1. **Centotheca lappacea,** *Desv. in Nouv. Bull. Soc. Philom.* v. 2 (1810) p. 189, *et in Journ. Bot.* (1813) v. 1, p. 71. A stout erect grass; stem 1–3 ft. high, erect from a woody rootstock with stout root-fibres. Leaves 4–10 by 1–1¼ in., oblong-lanceolate, acute or acuminate, more or less unequal-sided, thin, smooth, glabrous or sparsely hairy, 9–11-nerved, base narrowed; sheaths usually glabrous except at the mouth; ligule a broad sometimes lacerate membrane. Panicle 8–10 in. long and broad, branches slender, suberect. Spikelets ⅛ in. long, oblong-lanceolate, acute. Invol.-glumes distant; lower $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate, acute, apiculate, 3-nerved; upper ⅛–⅙ in. long, ovate-oblong, acute, apiculate, 3–5-nerved; lower floral glume ⅛–⅕ in. long, broadly ovate-oblong, obtuse, apiculate, 7-nerved; upper floral glume about as long as the lower, oblong, obtuse, 7-nerved, finely apiculate, usually with 2 rows of tubercle-based ultimately deflexed bristles close to each margin in the upper part of the glume, sometimes naked; palea $\frac{1}{10}$–$\frac{1}{8}$ in. long, narrowly lanceolate, acute, with ciliolate keels. Fl. B. I. v. 7, p. 332; Trim. Fl. Ceyl. v. 5, p. 304; Woodr. in

Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1217. *Melica diandra*, Roxb. Fl. Ind. v. 1 (1832) p. 327; Grah. Cat. p. 236.—Flowers: Oct.

KANARA: Kadgal (N. Kanara).—DISTRIB. India (Himalayas, Khasia Hills, Central India, Birma); Ceylon, Malaya, China, Polynesia, Tropical Africa.

66. **ELYTROPHORUS,** Beauv.

An annual, erect, glabrous grass. Leaves very narrow, flat. Inflorescence of globose clusters of minute sessile spikelets crowded together in long continuous or interrupted catkin-like spikes (rarely on the short spike-like branches of a very contracted raceme). Spikelets short (many imperfect or reduced to empty glumes), strongly laterally compressed, not articulate at the base, 4–6-flowered; rhachilla very short, articulate at the base and between the flowering glumes, but not beyond the upper. Involucral-glumes subequal, lanceolate, aristately acuminate, hyaline, 1-nerved, glabrous or ciliate, keeled; floral glumes rather longer, with a long awn, 3-nerved, with ciliate margins, the uppermost neuter; palea shorter than the glume, very broad, truncately 3-lobed, the lobes ciliate, keels distant, winged, smooth. Lodicules 2, obliquely oblong. Stamens 1–3; anthers minute. Styles free, long; stigmatic hairs very short. Grain minute, fusiform or narrowly oblong; pericarp loose at both ends.—DISTRIB. Tropical Asia, Africa, and Australia.

1. **Elytrophorus articulatus,** *Beauv. Agrost.* (1812) p. 67. Annual, 6–24 in. high; stems erect from a densely fibrous root, as thick as a crow-quill or less. Leaves longer or shorter than the stem, linear, acute, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, smooth, flaccid, base narrow; sheaths membranous, loose; ligule small, membranous, lacerate. Inflorescence 6–12 in. long, often longer than the rest of the plant. Spikelets $\frac{1}{8}$ in. long (including awns), as broad as long. Lower involucral-glume $\frac{1}{10}$ in. long; upper involucral-glume $\frac{1}{8}$ in. long; floral glume (including awn) $\frac{1}{8}$ in. long, ovate-lanceolate; palea $\frac{1}{10}$ in. long, broadly oblong, truncately 3-lobed. Fl. B. I. v. 7, p. 306; Trim. Fl. Ceyl. v. 5, p. 288; Duthie, Fodd. Grass. N. India, p. 61; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 379; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1218.—Flowers: Nov.–Feb. VERN. *Jangli-rála.*

KONKAN: *Law!*; Kalyan, *Woodrow.* S. M. COUNTRY: Londa, *Woodrow.* GUJARAT: Godra, *Woodrow.*—DISTRIB. More or less throughout India; Ceylon, Tropical Asia, Africa, and Australia.

67. **ÆLUROPUS,** Trin.

Low much-branched very rigid perennial leafy grasses. Leaves distichous, short, strict, usually convolute, coriaceous, pungent. Spikelets 6-many-flowered, minute, sessile, densely crowded in terminal villous heads, laterally compressed, not articulate at the base; rhachilla obscurely jointed at the base, not produced beyond the upper glume; internodes very short. Glumes many, oblong, membranous, apiculate, the margins and tips broadly hyaline. Involucral-glumes unequal, persistent; lower involucral-glume narrowly oblong, 1–3-nerved; upper involu-

glume much larger, 5–7-nerved from below the hyaline tip; floral glumes oblong, apiculate, 7–9-nerved; palea very large, broadly cuneate, 3-lobed, the lobes erose, flaps broad, keels nearly smooth or ciliolate. Lodicules obliquely truncate. Stamens 3; anthers minute. Styles short, free; stigmas short, plumose. Grain oblong or obovoid, free within the glumes.—DISTRIB. From the Mediterranean and Caspian regions to the Panjáb, Sind, and S. India; species few.

1. **Æluropus villosus,** *Trin. ex L. Mey. Verz. Pflanz. Cauc.* (1831) p. 18. Perennial, rigid, tufted; stems 3–8 in. long, crowded on a woody rootstock with stout root-fibres, as thick as a crow-quill, simple or branched, smooth and polished; branches sometimes elongate, divaricate, 6–10 in. long, resembling stolons, giving off branchlets at the nodes but not rooting; nodes glabrous; internodes short or long. Leaves $\frac{1}{6}$–1 in. long, narrowly lanceolate, acuminate, flat or convolute and subulate, erect or spreading, glabrous or sparsely ciliate; sheaths short, terete or inflated, glabrous or ciliate; ligule a shortly hairy ridge. Heads of spikelets shortly pedunculate, subglobose or oblong. Spikelets reaching $\frac{1}{8}$ in. long, 4–8-flowered, crowded, sessile, villous with soft hairs, pale green or white. Lower invol.-glume $\frac{1}{10}$ in. long, ovate-oblong, subacute, hairy and with ciliate margins; upper invol.-glume $\frac{1}{8}$ long, similar; floral glumes $\frac{1}{8}$ in. long, ovate, subobtuse, apiculate, many-nerved, hairy and ciliate, the lower 2–4 sometimes neuter; palea broad, 3-lobed. Anthers $\frac{1}{16}$ in. long, oblong. Grain $\frac{1}{40}$ in. long, obovoid-oblong, dorsally compressed. Fl. B. I. v. 7, p. 334; Trim. Fl. Ceyl. v. 5, p. 304; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441. *Æluropus lagopodioides,* Trin. ex Thw. Enum. (1864) p. 374; Lisboa, in Journ. Bomb. Nat. v. 7 (1893) p. 389. *Dactylis lagopoides,* Linn. Mantiss. 1 (1767) p. 33; Grah. Cat. p. 236; Dalz. & Gibs. p. 298 (*lagopodioides*).—Flowers: Nov.–Dec.

KONKAN: *Stocks*!, *Law*!; on the salt ground near the sea, *Graham, Lisboa*; Salsette, *Wight*, 531! SIND: *Dalzell*!; near salt creeks in Sind, *Stocks*, 506!; Karachi, *Woodrow*.—DISTRIB. India (Panjáb, W. Peninsula, in salt ground); Ceylon, Mediterranean region, Arabia, Persia, Afghanistan, Caspian regions.

68. **OROPETIUM,** Trin.

Dwarf densely-tufted erect perennial or annual grasses. Leaves short, filiform. Florets 1–3, hermaphrodite or the upper rudimentary, shorter than the upper invol.-glume. Spikelets minute, half immersed in the alternating distichous cavities of a simple slender curved inarticulate spike, sessile, not articulate on the rhachis; rhachilla bearded, articulate at the base, not produced beyond the flowering glume. Lower invol.-glume minute, hyaline, persistent; upper invol.-glume linear-lanceolate, rigid, recurved in fruit, tip subobtuse or emarginate; floral glumes concealed by the upper invol.-glume which closes the cavity in which the floral glume is hidden, sessile, ovate or elliptic, hyaline, 1-nerved; callus very short, bearded with silky hairs; palea as long as the glume; keels smooth. Lodicules very minute, obliquely cuneiform. Stamens 3; anthers oblong. Styles short; stigmas plumose, laterally exserted. Grain oblong, smooth, brown, free in the glume.—DISTRIB. Species 6, in India, Algeria, and S. Africa.

1. **Oropetium Thomæum,** *Trin. Fund. Agrost.* (1820) p. 98. Whole plant 2–3 in. high, forming hard tufts with capillary root-fibres; stems compressed. Leaves shorter or longer than the stems, erect or curved, filiform, acute, coriaceous, striate, sparsely ciliate with long hairs; sheaths membranous, compressed; ligule an erect lacerate membrane. Spikes 1–1½ by $\frac{1}{30}$ in., erect, straight or slightly curved; rhachis undulating, 4-gonous. Spikelets reaching $\frac{1}{10}$ in. long, acute, 1-flowered. Lower invol.-glume minute, hyaline; upper invol.-glume $\frac{1}{12}$ in. long, linear-lanceolate, rigid, recurved in fruit; floral glume $\frac{1}{16}$ in. long, semicircular in profile, 2-fid, hyaline; callus bearded. Anthers $\frac{1}{50}$ in. long. Grain $\frac{1}{30}$ in. long, somewhat fusiform, reddish-brown. Fl. B. I. v. 7, p. 366; Dalz. & Gibs. p. 300; Trim. Fl. Ceyl. v. 5, p. 271; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1231.

On old walls, *Dalzell & Gibson.* DECCAN: Poona, *Woodrow*; Junnar near Poona, *Woodrow.*—DISTRIB. Throughout the plains of India; Ceylon.

69. **BAMBUSA,** Schreb.

Shrubs or trees usually large and cæspitose (rarely climbing); stem-sheaths broad, the blade often triangular. Leaves shortly petiolate, not tessellate by nervules but sometimes so by pellucid glands; sheaths variously auricled. Spikelets 1-flowered, usually arranged in a large leafless panicle bearing heads or spiciform branches, or in leafy panicles, or in paniculate spikes. Lower glumes 1–4, empty or bulbiferous; flowering glumes ovate-lanceolate, the uppermost imperfect; palea 2-keeled. Lodicules 2 or 3, membranous, ciliate, rarely obsolete. Stamens 6, free. Ovary oblong or obovoid, with a hairy tip; styles short or long; stigmas 2–3. Grain oblong or linear-oblong, furrowed on one side; pericarp thin, adherent to the seed.—DISTRIB. Species about 50, Eastern Asia, 1 in Australia.

1. **Bambusa arundinacea,** *Willd. Sp. Pl.* v. 2 (1799) p. 245. Thorny; stems many, tufted on a stout rootstock, 80–100 ft. high by 6–7 in. in diam., usually graceful and curving; nodes prominent (the lowest rooting), the lower emitting horizontal, almost naked shoots armed at the nodes with 2–3 stout recurved spines sometimes 1 in. or more long; internodes up to 18 in. long; walls 1–2 in. thick; stem-sheaths coriaceous, variable in shape, up to 12–15 by 9–12 in., striate, with rounded tip and plaited margins, when young orange-yellow streaked with green or red and thickly ciliate with golden hairs, blade up to 4 in. long, triangular, acuminate, glabrous outside, densely hirsute inside, the margins decurrent, thickly ciliate; ligule narrow, entire or fringed with pale hairs. Leaves up to 7–8 by 1 in., linear or linear-lanceolate, tip stiff, glabrous or puberulous beneath, one or more margins scabrous, base rounded, ciliate, midrib narrow, nerves 4–6 with 7–9 intermediate and a few transverse pellucid glands; leaf-sheath ending in a thick callus and shortly bristly auricle; ligule short. Inflorescence an enormous panicle often occupying the whole stem; branchlets bearing loose clusters of pale, suberect, lanceolate, acute, glabrous spikelets ½–1 by ⅕ in. Invol.-glumes 2 or 0, ovate-lanceolate, acute or mucronate, ⅕–⅓ in. long, many-nerved, empty; floral glumes 3–7, the uppermost

1–3 male or neuter; palea subacute with 2 ciliate keels. Lodicules 3, ovate or subovate, hyaline, ciliate, 1–3-nerved. Anthers yellow, obtuse. Style short. Grain $\frac{1}{5}$–$\frac{1}{3}$ in. long, oblong, beaked by the style-base, grooved on one side. Fl. B. I. v. 7, p. 395; Grah. Cat. p. 239; Dalz. & Gibs. p. 299; Gamble, Bamb. Brit. Ind. (1896) p. 51; Trim. Fl. Ceyl. v. 5, p. 313; Talb. Trees, Bomb. ed. 2, p. 347; Bedd. For. Man. in Fl. Sylvat. p. ccxxxi; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442; Prain, Beng. Pl. p. 1232; Watt, Dict. Econ. Prod. v. 1, p. 390. *Bambusa Arundo*, Klein & Nees, in Linnæa, v. 9 (1834) p. 471; Dalz. & Gibs. p. 299.—VERN. *Kalak*.

KONKAN: Western Ghâts, *Gamble*. GUJARAT: *Gamble*; Dangs, *Woodrow*.—DISTRIB. Throughout India except the Himalayas; Ceylon.

Bambusa vulgaris, Schrad. in Wendl. Collect. v. 2 (1810) p. 26, t. 47. Unarmed; stems 20–50 ft. high by 2–4 in. in diam., rather distant, green, yellow, or striped; nodes hardly raised; internodes 10–18 in. long; stem-sheaths 6–10 by 7–9 in., the top rounded, retuse. Leaves 6–10 by $\frac{2}{3}$–$1\frac{2}{3}$ in., pale, linear-lanceolate, petiolate, 6–8-nerved; leaf-sheaths striate, laxly hairy; ligule short, ciliate. Panicle large, leafy. Spikelets $\frac{5}{8}$–$\frac{7}{8}$ in. long, in bracteate clusters of 3–10. Invol.-glumes 1–2, ovate, acute, empty; floral glumes 6–10, larger, then 1 imperfect flower above. Cultivated in Bombay, Poona, Sattara, and Kolhapur, but not indigenous. Fl. B. I. v. 7, p. 391; Dalz. & Gibs. p. 299; Bedd. For. Man. in Flor. Sylvat. p. ccxxxii; Gamble, Bamb. Brit. Ind. (1896) p. 43; Trim. Fl. Ceyl. v. 5, p. 314; Talb. Trees, Bomb. ed. 2, p. 347; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442; Prain, Beng. Pl. p. 1232; Watt, Dict. Econ. Prod. v. 1, p. 394.—VERN. *Udha-bâns*.

VAR. *striata*, Gamble, l. c. p. 44. Rather smaller in size, has the stems striped with yellow and green, while the branchlets are yellow and the leaves somewhat smaller and paler. A very handsome variety well deserving of a place in gardens. There is an excellent plate in the Bot. Mag. (6079) which shows the variegated stem well. It is supposed to be a native of China and Japan, and is probably the result of cultivation (*Gamble*). *Bambusa striata* (sp.), Lodd. ex Lindl. in Penny Cyclop. v. 3 (1835) p. 357.

Bambusa nana, Roxb. Hort. Beng. (1814) p. 25. A thickly-growing evergreen cæspitose shrub; stems 6–10 ft. high, green when young, afterwards yellow. It is a native of China and Japan, and is sometimes grown in gardens. It makes a good hedge. Fl. B. I. v. 7, p. 390; Gamble, Bamb. Brit. Ind. (1896) p. 40; Trim. Fl. Ceyl. v. 5, p. 315; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442; Prain, Beng. Pl. p. 1232; Watt, Dict. Econ. Prod. v. 1, p. 392.—VERN. *Bârik*; *Bâmbu*.

70. **OXYTENANTHERA,** Munro.

Arborescent or scandent bamboos, usually of a medium or small size, unarmed, often gregarious; rootstock stout, usually creeping and stoloniferous; stem-sheaths various, usually rather narrow, the imperfect blade also narrow. Leaves variable, shortly petiolate. Inflorescence a large panicle of spicate heads of few or many spikelets. Spikelets

narrow, elongate, conical, 1–3-flowered, the uppermost usually fertile. Involucre-glumes 1–3, empty; floral glumes ovate, elongate, mucronate. Palea of lower florets 2-keeled, of upper florets convolute with obscure or obsolete keel. Lodicules 0. Stamens 6; filaments connate in an ultimately elongated membranous tube. Ovary ovoid; style slender; stigmas 1–3, more or less plumose. Grain elongate, beaked, grooved, smooth.—DISTRIB. Species 9, of which 8 are found in S. India, Birma, and Malaya, the remaining 1 a native of Tropical Africa.

Spikelets 1-flowered; style glabrous; anthers bristly-apiculate. 1. *O. monostigma.*
Spikelets 2-flowered; style hairy; anthers acute, not apiculate. 2. *O. Stocksii.*

1. **Oxytenanthera monostigma,** *Bedd. For. Man. in Flor. Sylvat.* (1873) p. ccxxxiii, *et Icon. Pl. Ind. Or.* (1874) p. 56, t. 234. A medium-sized bamboo; stems 10–15 ft. high by about 1 in. in diam., solid, covered with soft pale yellow velvety tomentum; nodes not very prominent; internodes long; stem-sheaths 6–9 in. long by 3 in. broad at the base, narrowed to the 2-lobed tip; blade in the sinus imperfect, about 3 in. long, linear-lanceolate, striate; ligule long, fimbriate. Leaves variable, pale green, 6–8 by 1½ in., linear-lanceolate, acuminate, unequally rounded at the base into a flat petiole, ending above in a setaceous twisted point, glabrous or nearly so above, sparsely hairy and pale beneath; midrib below yellow, shining; nerves 7–12; leaf-sheaths striate; ligule often ⅓ in. long, acute or rounded. Panicle large, terminal, of spicate branches bearing dense globular often large heads of spikelets up to 2½ in. in diam. Spikelets ¾–1 in. long, less than 1 in. broad, 1-flowered, with a long spinous apiculation, very numerous, the fertile and sterile about equal in numbers. Involucre-glumes 2–3, mucronate, empty; floral glume long, narrow, linear-lanceolate, convolute, with a long mucro; palea shorter than its glume, concave, not keeled, obtuse. Stamens exserted; anthers long, bristly-apiculate, the bristle somewhat hairy at the tip. Style long, glabrous; stigma at length curved, thickened. Grain narrow, linear-oblong, grooved, tipped with the conic style-base. Fl. B. I. v. 7, p. 402; Gamble, Bamb. Brit. Ind. (1896) p. 74, t. 65; Talb. Trees, Bomb. ed. 2, p. 347; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442.—VERN. *Choua.*

KONKAN: Ghâts, *Talbot, Woodrow.* DECCAN: Sâkhar-Pathâr hill near Lanoli, *Woodrow*; Sattara Ghâts, *Brandis*; Mahableshwar, *Fagan*; Poona districts, *Wroughton*; Ahmednagar, *Wilkins.* S. M. COUNTRY: *Ritchie*, 820. KANARA: N. Kanara, *Woodrow, Talbot.*—DISTRIB. India (W. Peninsula).

2. **Oxytenanthera Stocksii,** *Munro, in Trans. Linn. Soc.* v. 26 (1868) p. 130. A slender bamboo; stems 30 ft. high by 1–1½ in. in diam., grey-green, covered when young with a white or grey deciduous tomentum; nodes with a softly pubescent ring; internodes 6–12 in. long; stem-sheaths 6–9 in. long by 3–7 in. wide at the base, tapering upwards to a concavely truncate top, appressedly brown-hairy on the back, ciliate on the margins; blade imperfect, subulate, acuminate, rounded at the base and again expanded into a rounded, waved, long-fringed auricle on the top of the sheath; ligule ⅓ in. long, deeply fimbriate, conspicuous. Leaves 4–8 by ⅜–¾ in., rounded or attenuate at the base into a very short petiole 1/10 in. long, the top ending in a setaceous point, glabrous or nearly so above, glabrous or hairy below, with scabrous margins; midrib narrow; nerves 5–6; leaf-sheaths

striate, glabrous or at first pubescent; ligule long, dentate. Panicle large, of spicate heads reaching 1 in. in diam., with many closely packed spinous spikelets, the heads supported by rounded chaffy bracts. Spikelets $\frac{3}{8}$–$\frac{1}{2}$ in. long, narrow, glabrous, mucronate, many fertile mixed with a few sterile. Invol.-glumes 2, ovate, mucronate, 5–7-nerved, then 2 hermaphrodite florets; floral glumes ovate, subacute, with a strong mucro from the back; palea of the lower floret as long as the floret, 5-nerved between the 2 ciliate keels, obtuse, that of the upper floret concave, convolute, obtuse. Stamens long-exserted; anthers short, acute. Ovary ovoid, hairy; style long, hairy; stigma simple, plumose. Fl. B. I. v. 7, p. 403: Bedd. For. Man. in Flor. Sylvat. p. ccxxxiii; Gamble, Bamb. Brit. Ind. (1896) p. 75, t. 66; Talb. Trees, Bomb. ed. 2, p. 348; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442. —Flowers: Nov. VERN. *Chivari*; *Konda*.

KONKAN: *Stocks*. DECCAN: Panchgani (planted), *Woodrow*. KANARA: Kumpta, *Talbot*; commonly cultivated along the coast; rare in the Ghát forests of N. Kanara, *Talbot*.—DISTRIB. India (W. Peninsula).

71. **DENDROCALAMUS,** Nees.

Arborescent unarmed bamboos with densely branching rootstocks. Leaves shortly petiolate, the transverse nervules represented by pellucid glands. Spikelets in globose clusters on the long branches of a compound panicle, ovoid, 2–6-flowered. Invol.-glumes 2–3, empty, ovate, acute, many-nerved; floral glumes like the empty; palea of lower florets keeled, of the upper dorsally rounded, eciliate. Lodicules rare. Stamens 6; filaments free. Ovary hairy above, often depressed; stigma usually simple. Grain small; pericarp coriaceous or crustaceous. —DISTRIB. Species 16; South-eastern Asia.

1. **Dendrocalamus strictus,** *Nees, in Linnæa*, v. 9 (1834) p. 476. A deciduous densely tufted bamboo with strong stems 20–50 ft. high by 1–3 in. in diam., which are solid or only with a small cavity, glaucous-green when young, dull green or yellowish when old; nodes swollen, the lower often rooting; internodes 12–18 in. long; upper branches decurved; stem-sheaths variable, the lower 3–12 in. long, covered on the back with golden-brown stiff hairs (or in dry localities sometimes glabrous), striate, rounded on the top, ciliate on the margins, very slightly auricled, the imperfect blade triangular-subulate, hairy on both sides, especially so within; ligule narrow. Leaves 1–2 in. long in dry localities, up to 10 in. long in moist ones, $\frac{1}{4}$–$1\frac{1}{4}$ in. broad, rounded suddenly at the base into a short petiole, gradually narrowed upwards into an acuminate twisted point, rough and often hairy above, softly hairy beneath, with scabrous margins; nerves 3–6 pairs, with interposed pellucid glands; leaf-sheaths striate, hairy, callus prominent, auricle short, ciliate with a few wavy deciduous hairs; ligule narrow, serrate. Inflorescence a large branching panicle of dense globular heads about 1 in. in diam., $1\frac{1}{2}$–2 in. apart; rhachis rounded, smooth. Spikelets usually hairy, spinescent, the fertile intermixed with many sterile smaller ones, $\frac{1}{3}$–$\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{5}$ in., with 2–3 fertile florets. Invol.-glumes 2 or more, ovate, spinescent, many-nerved; floral glumes ovate, ending in a sharp spine, surrounded by ciliate tufts of hairs; palea

ovate or obovate, emarginate, the lower ones 2-keeled, the uppermost keelless, 6–8 nerved. Stamens long-exserted; anthers yellow, shortly apiculate. Ovary stipitate, turbinate; style long; stigma simple, plumose. Grain ½ in. long, ovoid to subglobose, brown, shining, hairy above, beaked with the persistent style-base. Fl. B. I. v. 7, p. 404; Bedd. Flor. Sylvat. t. 325, et For. Man. p. ccxxxv; Gamble, Bamb. Brit. Ind. (1896) p. 78, tt. 68, 69; Talb. Trees, Bomb. ed. 2, p. 347; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442; Prain, Beng. Pl. p. 1234; Watt, Dict. Econ. Prod. v. 3, p. 72. *Bambusa stricta*, Roxb. Hort. Beng. (1814) p. 25; Dalz. & Gibs. p. 299.—VERN. *Kania bâns*; *Més.*

Throughout the Presidency in deciduous forests, *Talbot.* KONKAN: planted, *Woodrow.* DECCAN: rocky hills, *Gamble.* GUJARAT: Panch Mahâls, *Woodrow.*—DISTRIB. Throughout India; Java. This bamboo is known as the "male bamboo."

Dendrocalamus giganteus, Munro, in Trans. Linn. Soc. v. 26 (1868) p. 150. A gigantic bamboo sometimes grown in gardens, a native of the Malay Peninsula and Penang. It is perhaps the largest bamboo known, the stems reaching 100 ft. high with a diameter of 8–10 in. Stem-sheaths very large, 20 in. long and about as broad at the base, the imperfect blade 5–15 in. long and reaching 3½ in. broad. Leaves up to 20 by 4 in., cuspidately acuminate; ligule broad, fimbriate, sometimes cleft in the middle. Inflorescence a very large panicle with slender curved branches. Spikelets ½–⅝ by ⅓ in., many-flowered, ovate, acute, spiny. Anthers ⅓–⅔ in. long, acuminate at the tip. Fl. B. I. v. 7, p. 406; Gamble, Bamb. Brit. Ind. (1896) p. 87, t. 76; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442.—DISTRIB. Malay Peninsula; Penang.

72. **OCHLANDRA,** Thw.

Shrubby gregarious reed-like bamboos; stems small, thin-walled, erect; internodes rather long; stem-sheaths thin, persistent, auricles small. Leaves small to moderate-sized, linear or oblong-lanceolate, acuminate, shortly petiolate; leaf-sheaths striate, fringed; ligule usually short. Inflorescence a terminal spike or spike-like panicle on a leafy branchlet; spikelets verticillate, partly fertile, partly sterile. Spikelets 1-flowered, often very large. Invol.-glumes 2–6, variable, usually mucronate, empty; floral glume similar to the last invol.-glume, mucronate. Palea membranous, not keeled. Lodicules 1-several, conspicuous, variable, usually appressed to the filaments. Stamens many, from 6 to 120; anthers large, narrow, usually apiculate. Ovary narrow; style elongate; stigmas 4–6, plumose or papillose. Grain large or very large, ovoid, long-beaked, supported by the persistent glumes; pericarp very thick, fleshy.—DISTRIB. India (W. Peninsula), Ceylon, Malay Peninsula; species 7.

1. **Ochlandra Talboti,** *Brandis, Ind. Trees* (1906) p. 684. Stems numerous in dense clumps, slender, ½–¾ in. in diam., hollow, sometimes scandent; nodes thickened, shining, glabrous. Leaves glabrous, pale, lanceolate, long-acuminate, 8–12 by 1½–2½ in., on a petiole ¼ in. long;

leaf-sheaths glabrous, the bristles at the mouth early deciduous; ligule bearded. Spikelets in half whorls on a terminal erect spike 4–8 in. long, glabrous or with a few soft hairs at the tips of the glumes, the fertile spikelets few, 1¼ in. long. Invol.-glumes 3–6, empty. Lodicules 6, linear, nerved. Stamens 25–40; anthers ½ in. long, minutely apiculate; filaments long, slender. Ovary prolonged into a slender style 1½ in. long; stigmas 5, papillose (*Talbot*). Grain ovoid, 2–3 by ⅓ in., narrowed into a long beak, supported by 4 persistent glumes. Flowered in 1896 in N. Kanara and had not been seen in flower for many years till then in that district. *Ochlandra Rheedei* var. *sivagiriana*, Talbot, Trees, Bomb. p. 348 (*not* of Gamble). *O. stridula*, Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442 (*not* of Thwaites).—VERN. *Huda.*

KANARA: *Talbot.*

This bamboo has been identified with *O. Rheedei* var. *sivagiriana* and with *O. stridula*, both of which plants flower annually, while this flowers at long intervals according to Mr. Talbot.—DISTRIB. India, W. Peninsula.

The following non-indigenous plants not belonging to any of the foregoing genera are grown for ornament or for economic use:—

Zea Mays, Linn. Sp. Pl. (1753) p. 971. The well-known *Maize* or *Indian Corn*, a tall stout annual monœcious grass, a native of America, is cultivated widely to afford a forage for cattle. *It is not very largely* cultivated for flour in the Bombay Presidency, though on the Panch Mahâls it ranks as a staple. It is grown widely for use as a vegetable, the unripe cobs being boiled or roasted. Fl. B. I. v. 7, p. 102; Grah. Cat. p. 240; Dalz. & Gibs. Suppl. p. 100; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 436; Prain, Beng. Pl. p. 1209; Watt, Dict. Econ. Prod. v. 6, part 4, p. 327.—VERN. *Buta*; *Maka.*

Avena sativa, Linn. Sp. Pl. (1753) p. 79. The common *Oat*, so well known and largely used as food for horses in Europe, is rarely cultivated in the Bombay Presidency. It has been grown in Hyderabad (Sind), but has not been found as good for horse-feeding as the *Gram* (*Cicer arietinum*). Fl. B. I. v. 7, p. 275; Dalz. & Gibs. Suppl. p. 97; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1217; Watt, Dict. Econ. Prod. v. 1, p. 356.—VERN. *Jai.*

Arundo Donax, Linn. Sp. Pl. (1753) p. 81. A native of the Lower Himalayas, the Panjâb, Naga, Nilgiri and Kurg Hills, extending to Europe and N. Africa, is often grown as an ornamental grass in clumps in large gardens or on lawns. It is a tall grass 6–10 ft. high, with flowers in large erect thyrsiform decompound panicles 1–2 ft. long. A variegated variety is also grown. Fl. B. I. v. 7, p. 302; Woodr. Gard. in Ind. ed. 5 (1889) p. 548; Journ. Bomb. Nat. v. 13 (1901) p. 440; Prain, Beng. Pl. p. 1218; Watt, Dict. Econ. Prod. v. 1, p. 336.

Triticum sativum, Lam. Flor. Fr. ed. 1, v. 3 (1778) p. 625. *Wheat*, widely cultivated, but nowhere found wild. Duthie, Fodd. Grass. N. Ind. (1888) p. 68; Watt, Dict. Econ. Prod. v. 6, part 4, p. 89.

Triticum æstivum, Linn. Sp. Pl. (1753) p. 85; Roxb. Fl. Ind. v. 1, p. 359; Grah. Cat. p. 234; Dalz. & Gibs. Suppl. p. 97. *T. vulgare*, Villars, Hist. Pl. Dauph. v. 2 (1787) p. 153; Hook. f. Fl. B. I. v. 7, p. 367; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Prain, Beng. Pl. p. 1231.—VERN. *Gahu*; *Ghui*. The specific name *sativum* is 9 years prior to that of *vulgare*.

As is not uncommon in the case of plants under cultivation for a long period, under varying conditions of climate and soil, many varieties or forms exist, of which the two following are those chiefly cultivated in the Bombay Presidency:—

VAR. *spelta*. *Covered-Grain Wheat*; *Spelt Wheat*. An inferior hard red wheat, the grain covered with a husk of indurated glumes, cultivated widely in the Bombay Presidency. *Triticum Spelta* (sp.), Linn. Sp. Pl. (1753) p. 86; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441 (*Speltum*).—VERN. *Khapala*; *Jod-Gahu*.

VAR. *pilosa*. Cultivated widely. The outer glumes are covered with much soft tomentum (*Dalzell & Gibson*). *Triticum pilosum* (sp.), Dalz. & Gibs. Bo. Fl. (1861), Suppl. p. 97; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441.—VERN. *Bakshi*; *Kala-Kusali*; *Kahno*.

Hordeum vulgare, Linn. Sp. Pl. (1753) p. 84. *Barley*. Annual, 2–3 ft. high, supposed by De Caudolle to have originated in Western temperate Asia. It is extensively cultivated in N. India, less extensively in the Bombay Presidency, where it is grown chiefly in Gujarat and Sind, less commonly in the Deccan. Fl. B. I. v. 7, p. 371; Prain, Beng. Pl. p. 1231; Watt, Dict. Econ. Prod. v. 4, p. 274. The three following varieties are cultivated:—

VAR. *hexastichon*, Aitch. Cat. Pb. & Sind Pl. (1869) p. 171. The most commonly cultivated kind. Spikelets in 6 rows. Fl. B. I. v. 7, p. 371; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Watt, Dict. Econ. Prod. v. 4, p. 275. *Hordeum hexastichon* (sp.), Linn. Sp. Pl. (1753) p. 85; Grah. Cat. p. 234; Dalz. & Gibs. Suppl. p. 96.—VERN. *Satu*; *Jau*.

VAR. *distichon*. Cultivated in Sind. Spikelets in 2 rows. Fl. B. I. v. 7, p. 371; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 441; Watt, Dict. Econ. Prodr. v. 4, p. 274. *Hordeum distichon* (sp.), Linn. Sp. Pl. (1753) p. 85.—VERN. *Jau*.

VAR. *nudum*, a beardless variety with spikelets in 2 rows and with the grain free from the palea, known as "*Naked or Loose-grained Barley*," is cultivated in Gujarat and Sind. Fl. B. I. v. 7, p. 372; Woodr. in Journ. Bomb. Nat. v. 13 (1901) p. 442. *Hordeum nudum* (sp.), Arduini, ex Schult. Mantiss. v. 2 (1824) p. 437. *Hordeum gymnodistichon* (var.), Duthie, Fodd. Grass. N. Ind. (1888) p. 70; Watt, Dict. Econ. Prod. v. 4 (1890) p. 274.—VERN. *Ua*; *Ujan*.

INDEX TO ORDERS, GENERA, SPECIES AND SYNONYMS.

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